11130180-42070-00000-00-00000 102-31
Opt 099-F300

OPERATOR'S MANUAL

Honeywell

IMPORTANT NOTICE

The device described herein has been manufactured and tested for correct operation and conformance to our published specifications and is warranted to perform as advertised.

Should your instrument require recalibration after a period of time, you will find instructions covering this procedure in the appropriate section of this manual.

Recalibration, unless required because of a defective component or workmanship, is considered a normal maintenance function.

Replacement of components and assemblies, where examination indicates the normal recommended maintenance practices, described herein, have not been followed, may not be covered by your warranty. In addition, expendable items such as pens, ink pads, slidewire contactor, relay contacts and other components of a similar nature are not normally covered by warranty unless examination reveals that replacement or repair is necessitated due to faulty workmanship or components.

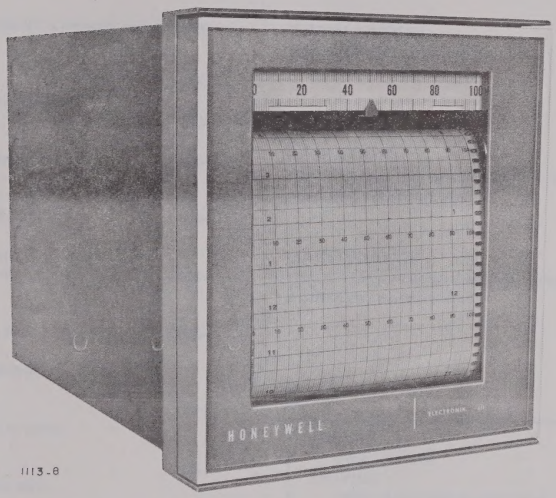
Should you have any questions relative to your warranty, please contact your nearest Honeywell office or write to the Director of Quality Assurance, Honeywell, Fort Washington, Pennsylvania 19034.

FOR THE RECORD...

... be sure to use Honeywell recording accessories
(See back cover for further details.)

CHARTS PENS INKS

INSTRUCTION MANUAL



ElectroniK* One-Eleven
Single Pen Strip Chart Recorder

KN11130180

Section 011-74 ISSUE 1

4/68

Industrial Division ▫ Fort Washington, Pa. 19034

* Tradename-Honeywell Inc.

With this OPERATOR'S MANUAL we are supplying a book specific to this one instrument and containing a minimum of extraneous data about all the other thousands of variations in the ElectroniK 111/112 product line. To do this we have sectionalized not only the text within this book, but also the Table of Contents.

In general, the TYPE OF DATA listed in the column on the right side of this page is indexed by the numbers in the margins of all the odd numbered pages.

The PORTION OF THE INSTRUMENT is indexed through separate Tables of Contents sections:

BASIC INSTRUMENT CHASSIS 101-
Portions fundamental to the model indicated
ENCLOSURE 102-
Door, case, etc.
MEASURING SYSTEM (if not included in the 103-
101 section)
Measuring circuit, constant voltage unit
BALANCING SYSTEM (if not included in the 104-
101 section)
Slidewire, servo amplifier, servomotor
INDICATION & RECORDING (that not 105-
already in the 101 section)
Pens, print carriage, etc.
CONTROL, if any (may be more than one 106-
section)
Set point, error signal generator, control
units, etc.
NON-CONTROL OUTPUT, if any 107-
Backset switches, transmitting elec. or pneu.
signal, etc.
OPTIONS, if any 108-
Any variations not covered by above categories

SPECIAL INSTRUMENTS

When an instrument is provided with non-standard parts, or non-standard combination of standard parts, a SUPPLEMENTARY DATA section is added to the front of this manual. In such a case, even if a wiring diagram or instruction section is listed in one of the Tables of Contents, it may be omitted or replaced by a substitute. The model number of these special instruments are usually preceded by the letter "Y." The SERVICE MANUAL does not normally cover the special portions of these instruments.

DESCRIPTION 1
What you have: location of components, basic functions of components.

INSTALLATION 2
How to mount and connect

OPERATION 3
How to make it run; where to turn on, adjust; change chart, pen, ink ribbon, etc.

MAINTENANCE 4
How to keep it running: cleaning, lubrication, calibration, accessibility to components

NOTE:

THEORY 5
(How it runs),
SERVICE 6
(What to do when it stops), and
SCHEMATICS 8
are available in a separate SERVICE MANUAL, which may be purchased upon request (see order blank at end of this manual). There may be some references in this OPERATOR'S MANUAL to sections of the 5XX or 6XX series which are located in the SERVICE MANUAL.

PARTS LIST 7
Which parts are available; orientation aid.

DRAWINGS 8
Dimension drawings, connection diagrams, wiring diagrams

You will notice this book is composed of many sections which are selected according to the options and variations on your specific instrument. Our only key to the assembly of this book, as well as the manufacture of your instrument is the COMPLETE model number.

PLEASE INCLUDE THE FULL MODEL NUMBER ALONG WITH THE SERIAL NUMBER WHENEVER YOU WRITE US CONCERNING YOUR INSTRUMENT.

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	Section	
MARGINAL INDEX	012-6	
DESCRIPTION		1
Basic functions; Specifications	111-322	
Location of Components	112-118	
INSTALLATION		2
Shield connections	224-5	
OPERATION		3
Basic instrument adjustments	311-81	
MAINTENANCE		4
Access to servo package	431-2	
SERVICE		6
To order service manual	990-1	
PARTS LIST		7
Orientation of subassemblies	711-171	
Drawbridge	715-51	
Sub-chassis	716-76	
Chart Transport	752-34	
Side plates and chart drive	753-4	
DRAWINGS	899-36	8

K: 1113XXXX
1114XXXX
1117XXXX

TABLE OF CONTENTS

This enclosure is used with non-controllers, contact controllers, or proportional controllers where the control unit itself is mounted separately.

		Section
		1
INSTALLATION Enclosure	212-45	2
PARTS LIST Enclosure	714-58	7
DRAWINGS Dimension	30702943	8

K: 111XXXX0

TABLE OF CONTENTS

Section

DESCRIPTION 1
See section 112 for location of measuring circuit and constant voltage

OPERATION 3
See section 311 for adjustment of span and zero.

MAINTENANCE 4
Calibration preparation 422-8
Calibration procedure 424-1
See section 431 for access to measuring circuit and constant voltage units.

PARTS LIST 7
See section 731 for part numbers of measuring circuit and constant voltage units.

FM: XX07X

TABLE OF CONTENTS

Section

DESCRIPTION 1
See section 112 for location of slidewire, amplifier, measuring circuit, constant voltage unit, servo motor.

OPERATION 3
See section 311 for adjustment of gain.

MAINTENANCE 4
Slidewire access, cleaning 446-1
For access to servo package components (amplifier, measuring circuit, constant voltage unit) see section 431.

PARTS LIST 7
Servo amplifier case assembly 731-8
Amplifier 742-32
Servo motor 749-5
See section 716 for servo slidewire.

I-II: 41XXX to 43XXX
46XXX, 47XXX
51XXX to 53XXX
56XXX, 57XXX
61XXX to 63XXX
56XXX, 67XXX

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Strip chart components	153-22
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Pen lifter, ink cartridges	354-32
MAINTENANCE	
Checks and procedures	411-103
Lubrication points	453-6
PARTS LIST	
Fibre tip pen and carriage	754-30
Accessories	789-1
DRAWINGS	
Customer connection	30702949
Internal wiring diagram	30730322

K: 1113X12X
1113X18X

ELECTRONIK 111/112 ONE/TWO CARTRIDGE-PEN STRIP CHART

Section 105-142, Issue 2

TABLE OF CONTENTS

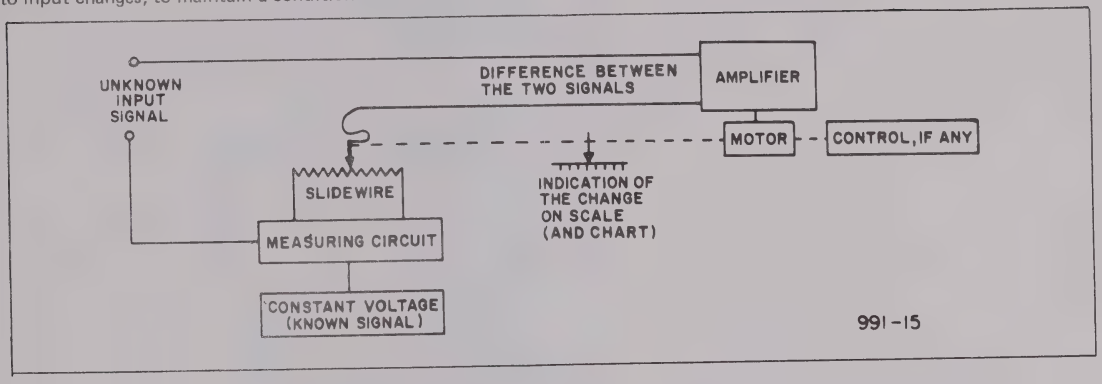
	Section
DESCRIPTION	
Strip chart components	153-22
INSTALLATION	
Connection and mounting	222-12
OPERATION	
Chart transport, changing chart, gears	353-4
Pen lifter, ink cartridges	354-32
MAINTENANCE	
Checks and procedures	411-103
Lubrication points	453-6
PARTS LIST	
Fibre Tip Pen and Carriage See also 752 and 753 sections	754-30

NOTE: This instrument is supplied with cartridge type fiber tip marking assemblies. Ignore all reference to capillary type pen systems which may appear in this manual.

Printed in United States 10/75

WHAT YOU HAVE

This ElectroniK* instrument is an automatic null balance servo potentiometer. Used in conjunction with many types of primary elements, it automatically measures the magnitude of a variable by comparing the input signal from the primary element with a feedback signal from the measuring circuit and automatically repositions an indicating or writing device in response to input changes, to maintain a condition of electrical balance.



The servo system includes components that translate the input signal into an indication of the value of the measured variable:

- Slidewire develops feedback signal.
- Constant Voltage Unit provides reference signal.
- Measuring Circuit compares the two and produces an error signal.
- Amplifier circuit that converts the d-c error signal into an a-c signal and amplifies that signal to drive the servo motor.
- Servo motor that develops the torque to reposition the slidewire and rebalance the system.
- Drive cable that translates the rotary motion of the servo motor into the motion of the indicator and/or writing device.

A more thorough explanation is in the THEORY portion of service manual 11-02-01, beginning with section 511.

Printed in U.S.A. 10/76

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Rated Performance Specifications

Accuracy
Spans 5 millivolts and above: ±(0.3 + 0.1 X suppression ratio) % of span (or 0.020 millivolts, whichever is greater).
Spans less than 5 millivolts: ±(0.3 + 0.1 X suppression ratio) % of span + 0.005 millivolts.

Reproducibility (24-hour)
Typically less than ±0.15% of Span.

Deadband
0.15% of Span.

Source Resistance Rating
For zero offset no greater than 1/2 deadband on millivolt and thermocouple spans; 10K ohms maximum on spans less than 5 mv, or balance speed of 1 second full scale. 2K ohms maximum on spans 5 mv or greater, or balance speeds of 5 or 15 seconds full scale.

Off Balance Input Resistance
40K ohms minimum on spans less than 5 mv, or pen speed of 1 second full scale.
300K ohms minimum on spans 5 mv or greater, or pen speeds of 5 or 15 seconds full scale.

Interference (stray) Rejection
Normal Mode (Transverse):
60 Hz: 0.5 x span
50 Hz: 0.2 x span
Common Mode (Longitudinal):
60 Hz: To 120 volts RMS
50 Hz: To 50 volts RMS
DC: 240 x span to 240 volts maximum.

OPERATING CONDITIONS

Temperature
Rated: 59° to 104°F (15° to 40°C).
Extreme: 16° to 140°F (−9° to 60°C).

Humidity
Rated: 10% to 90% RH.
Extreme: 5% to 90% RH (400 gains per lb. dry air max.).

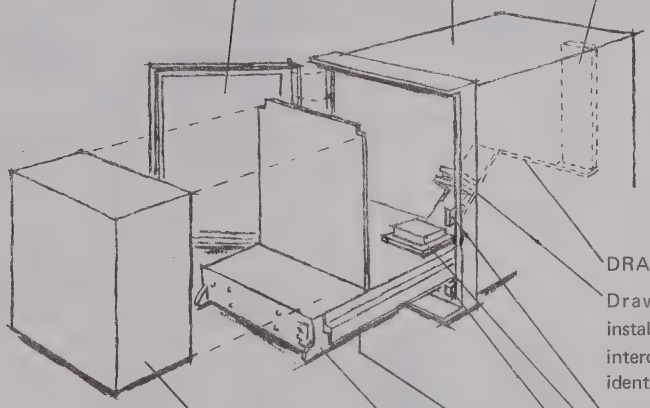
Vibration and Shock
Rated: To 70Hz and 0.1 G (1 G shock).
Extreme: To 200 Hz and 0.2 G (5 G shock).

Position (tilt)
To 15 degrees forward, to 45 degrees backward.

Power Requirements
Rated: 110 to 125 volts ac, 60 Hz (50 Hz optional).
Extreme: 100 to 130 volts ac.

Instrument rated performance meets or exceeds requirements of American National Standards Institute (formerly American Standards Association) specification C39.4 1966 for electronic potentiometers.

LOCATION OF BASIC COMPONENTS



Easily removed door of die-cast aluminum provided with gasket and 1/8" glass window.

Dust and moisture-resistant steel case suitable for relay rack, panel, or bench mounting. External dimensions of the case are specified on a separate diagram located in the reference drawing section 899 of this manual.

CUSTOMER TERMINAL PANEL (TB1)

DRAWBRIDGE

Drawbridge connector J1 permits installation and removal of chassis; permit interchange with any other chassis having identical electrical features.

SPRING TYPE DOOR LATCH

CONNECTOR J_2

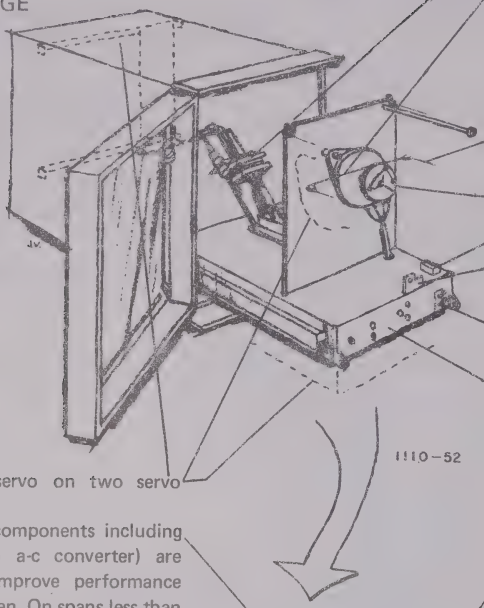
CHASSIS LATCH

SERVO PACKAGE INCLUDES:
Measuring Circuit Unit (MCU)
Constant Voltage Unit (CVU)
Amplifier

Die-case aluminum chassis has side rails to permit drawer-type withdrawal for access to control adjustment as well as for general service. Includes:
Slidewire
Servo motor
Any Primary control connections
Any Optional control variations

DISPLAY PACKAGE INCLUDES:
Display or Chart Transport
Servo Cables
Indicators (Pens, Carriage, Ink Supply, etc.)
Chart Drives

SERVO PACKAGE



Easily accessible fuse

Slidewire: is platinum resistance wire used to resist corrosion, has four contacts on slider to insure positive contact, has dust cover which is also part of measuring circuit shield, has 2550 convolutions for high resolution.

Drive cable and idler pulleys arranged to make cabling a simple job.

Servo Cable Drum

Calibration Rheostat, when provided.

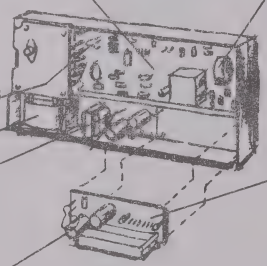
Flourescent lighting switch, when provided

Power Switch, Chart Drive Switch, when provided

Electrical span and zero can be adjusted via access holes provided in the front of the instrument chassis. Both adjustors have a 100-turn full scale adjustment without removing instrument from case.

Position of 2nd servo on two servo instruments

Amplifier Board - components including "chopper" (d-c to a-c converter) are transistorized to improve performance and lengthen life span. On spans less than 5 mv, carriage speed of 1 second or less, or print cycles of 2.4 seconds or less, a mechanical chopper version of a transistorized amplifier is used. See THEORY section for further discussion.



Servo Package enclosed by a housing and cover plate which are part of the Faraday shield used to overcome common mode stray noise.

Gain Jumper

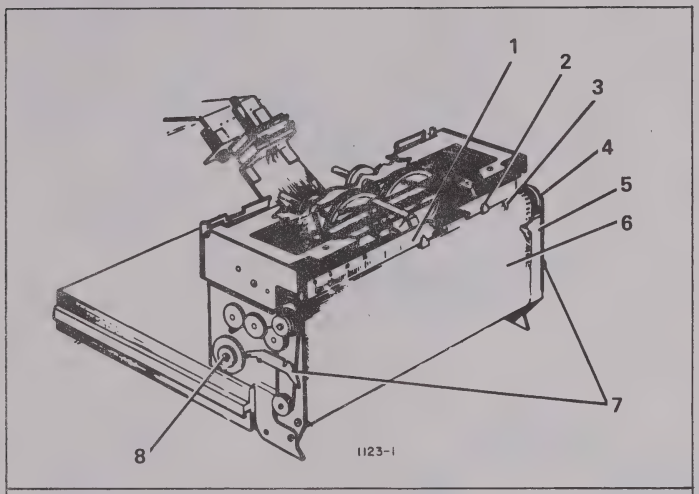
Constant Voltage Unit

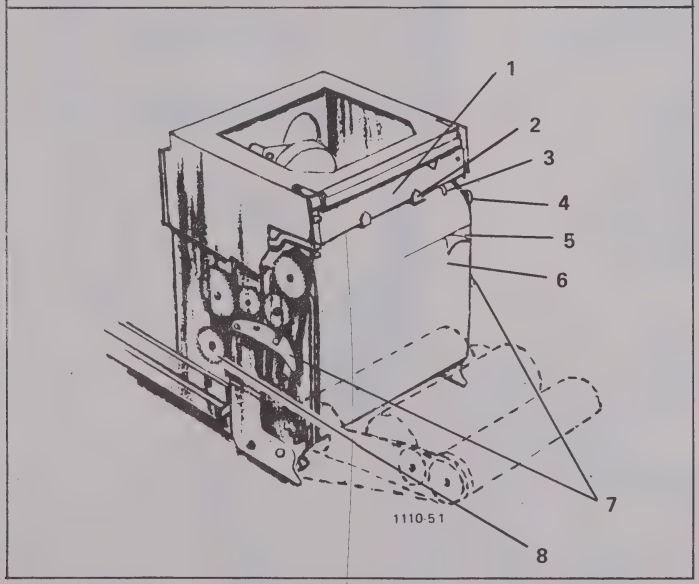
Measuring Circuit Board (or range card) can be easily removed and replaced by another card to provide the required range and actuation.

Measuring circuit uses precision manganin range resistors wound on plastic spools, and mounted directly to the range card. Composition type resistors are used in non-critical locations (the optional burnout resistors).

The physical appearance of the measuring circuit will vary, depending on the circuit configuration, for each instrument range and actuation. The basic circuit is modified as necessary to provide all actuations. Your circuit is described and shown schematically in the Theory section for the measuring circuit.

CAUTION: The servo package housing and cover plate may be at a relatively high potential (dependent on operating conditions) since the input potential and common mode stray potential are both present on the instrument shield. Refer to the discussion of shield connections in the installation procedures before touching or attempting to remove the cover plate of the servo package.





1 Calibrated width of chart and scale is 152,4 mm (6") on Class 111 instruments, and 279,4 mm (11") on Class 112 instruments; length is 122 feet. (Equivalent to 30 days of chart at 2 inches an hour). Length of chart record visible through window in door is 6 inches. Expansion and contraction in chart width will not exceed an average of 1% from 10 to 85% relative humidity change.

2 Indicator and replaceable fiber tipped recording cartridge.

3 Event Pen Option mechanically restricts servo and pen carriage to 95% full scale travel. If this option is provided, further discussion can be found in EVENT PEN OPERATION section 356 (index 3).

4 Manual Chart Advance

5 Chart Tear-off

6 Chart transport is designed so that the chart can be advanced or loaded without withdrawing the chassis from the case. Chart loading does not interfere with the instrument operation as an indicator or controller. The chart transport is hinged at the bottom, and pivots forward for chart loading. Chart transport is removable to permit preloading spare transport for a faster change.

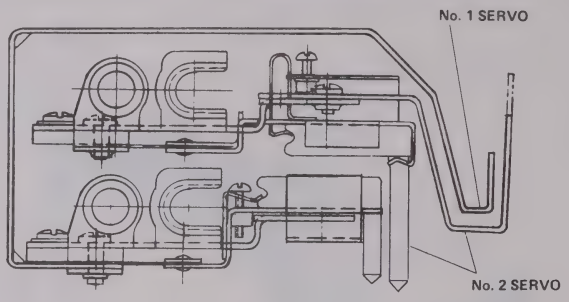
7 Chart transport Release Latches.

8 Change gears are provided (attached to left side plate) to vary the chart speed 1/2 or 2 times the basic speed.

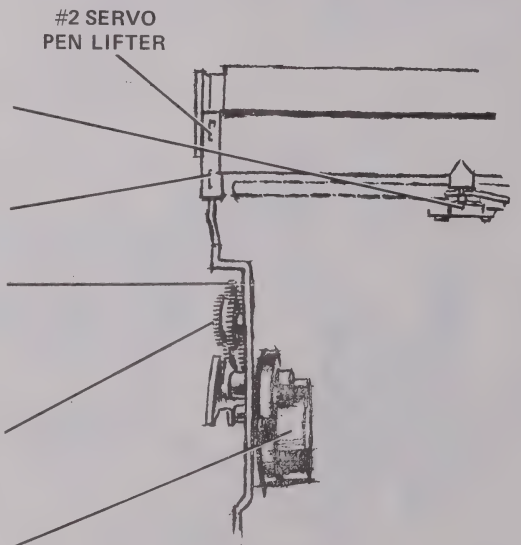
153-0022-110

Printed in United States 3/75

Orientation of pens on two servo variations.



1100-123



Design of the carriage and cable attachment is such that there is no error introduced in the reading of the pointer on the scale due to clearance in the pen carriage bearings.

Manual pen lifters also have automatic pen lifting action when chart transport release is pushed to drop chart transport for service or loading. #2 servo is over #1 servo.

Special shapped teeth are provided on the idlers where the gear train is separated to lower the chart transport for loading. This is to insure proper re-engagement when transport is again raised.

Chart drive gear train designed with anti-reversing spring in the system which allows easy positive adjustment of chart to a time line, and also reduces backlash in gear train. Time for chart to begin motion after motor is started is equivalent of 0.062" of chart length.

Basic chart speed can be altered by substitution of various synchronous chart motors.

1100-34

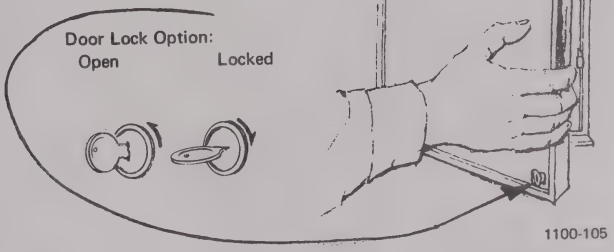
2

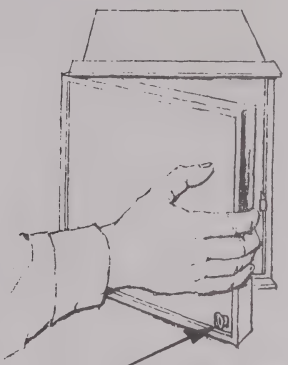
TO OPEN INSTRUMENT

A spring catch is located on right side of door.

Press fingers firmly against right edge of door and pull forward.

Door swings open to the left.

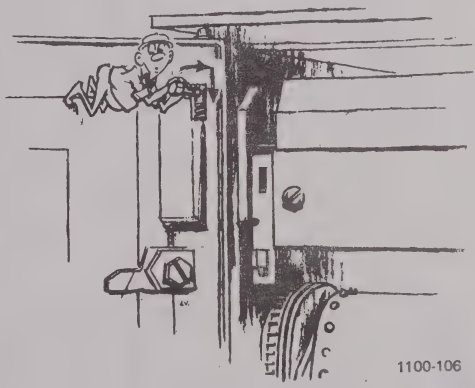




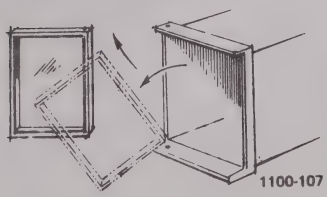
1100-105

TO REMOVE DOOR

1. Open door.
2. Firmly hold door with left hand.
3. Swing lever on top hinge pin away from door face and press it down.
4. Top of door will then swing clear from case, allowing it to be lifted from bottom hinge.



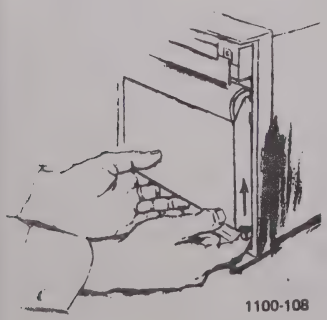
1100-106



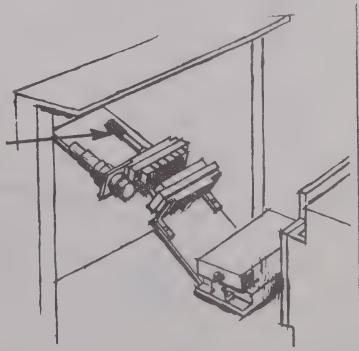
1100-107

TO REMOVE CHASSIS

1. Lift release latch, grasp platen, and slide chassis forward. Release latch. Latch will lock chassis in extended position. If instrument has just been unpacked, a strip of cardboard at top of chassis may offer resistance.
2. Disconnect terminal block on drawbridge using knurled jackscrew.
3. If this is a multipoint recorder see next page (which will be section 213) to disconnect selector switch before removing chassis in step 4. If this is a pneumatic controller or transmitter see next page (which will be section 216) to disconnect pneumatic drawbridge connector before removing chassis in step 4.
4. Again lift release latch to slide chassis completely out of case.



1100-108



1100-109

SELECT LOCATION

Area

Select area which is as close as practicable to process variable.

Limitations

Ambient temperature of selected clean, dry area should not exceed recommended instrument limits of 58°F to 104°F. Extreme temperatures of 16°F to 140°F can be tolerated without failure, but accuracy could be degraded.

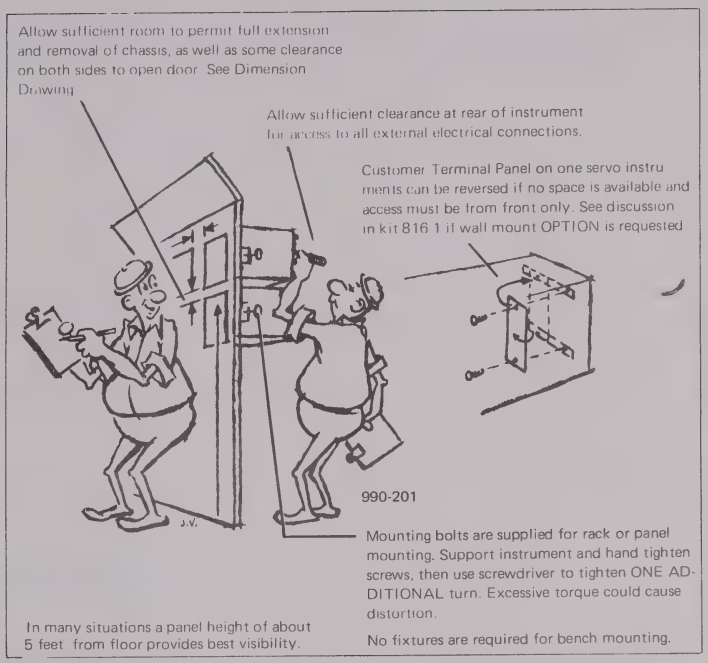
NOTE: Any ink used in pen type instruments will freeze at 15°F.

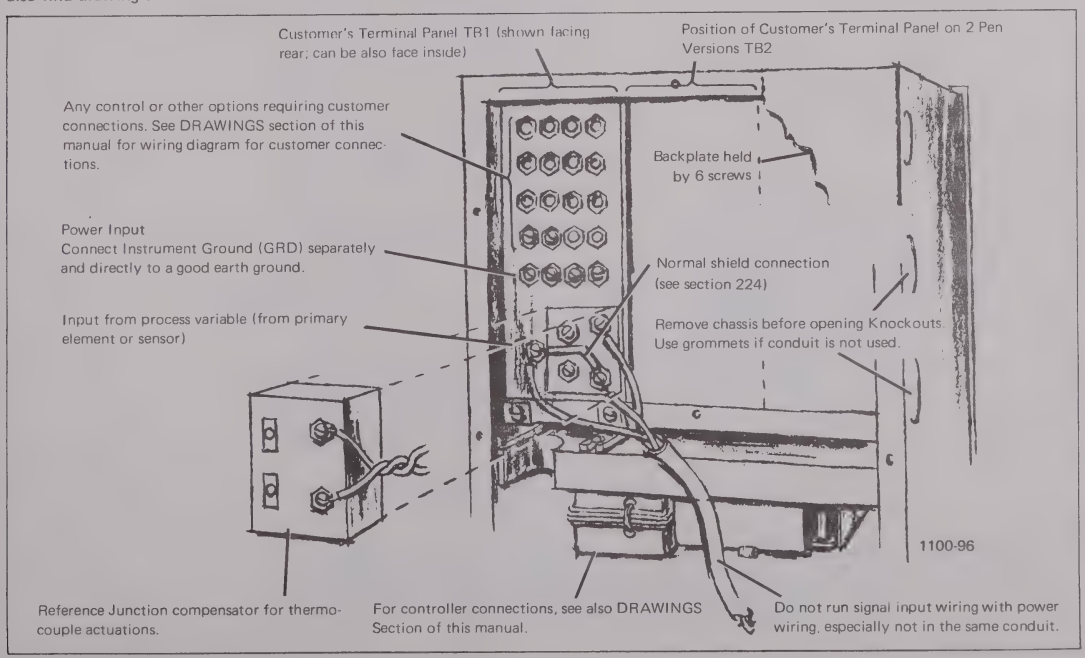
MOUNTING CASE

A mounting dimension drawing (in DRAWINGS section of this instruction) furnishes dimensions of enclosure. They are indexed in TABLE OF CONTENTS Section 102. Remove chassis from case before mounting case.

ELECTRICAL CONNECTIONS

An external wiring diagram for instrument shows external connections to customer terminal panel at rear of case. It is located in DRAWINGS section of this manual, and indexed in TABLE OF CONTENTS Section 105. For instruments with control, see also index in TABLE OF CONTENTS Section 106; for conductivity or pH/ORP actuations, see also index in TABLE OF CONTENTS Section 101. If 220/240 power OPTION is used, you will also find drawing 30703745.

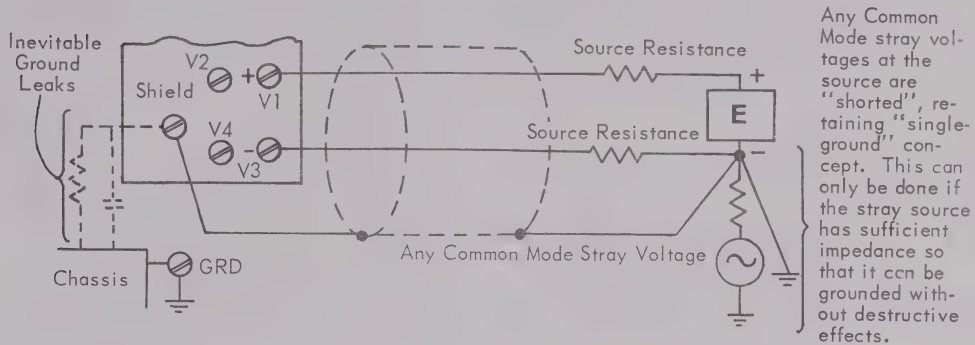

Allow sufficient room to permit full extension and removal of chassis, as well as some clearance on both sides to open door. See Dimension Drawing
Allow sufficient clearance at rear of instrument for access to all external electrical connections.
Customer Terminal Panel on one servo instruments can be reversed if no space is available and access must be from front only. See discussion in kit 816-1 if wall mount OPTION is requested
990-201
Mounting bolts are supplied for rack or panel mounting. Support instrument and hand tighten screws, then use screwdriver to tighten ONE ADDITIONAL turn. Excessive torque could cause distortion.
In many situations a panel height of about 5 feet from floor provides best visibility.
No fixtures are required for bench mounting.


Customer's Terminal Panel TB1 (shown facing rear; can be also face inside)
Position of Customer's Terminal Panel on 2 Pen Versions TB2
Any control or other options requiring customer connections. See DRAWINGS section of this manual for wiring diagram for customer connections.
Backplate held by 6 screws
Power Input
Connect Instrument Ground (GRD) separately and directly to a good earth ground.
Normal shield connection (see section 224)
Input from process variable (from primary element or sensor)
Remove chassis before opening Knockouts. Use grommets if conduit is not used.
1100-96
Reference Junction compensator for thermocouple actuations.
For controller connections, see also DRAWINGS Section of this manual.
Do not run signal input wiring with power wiring, especially not in the same conduit.

1. OBJECT

To cause as little stray current as possible to flow through the source resistance (that total resistance of the external circuit, looking out from the instrument input terminals). The best way to reduce the effect of stray is to have as low source resistance as is practical.

2. IDEAL SITUATION (BUT NOT OFTEN POSSIBLE)



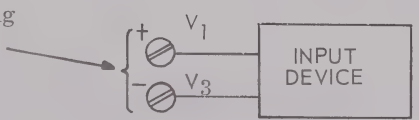
3. TYPES OF INTERFERENCE STRAY

a. NORMAL MODE

(1) That interference appearing as a voltage between or in series with the input terminals.

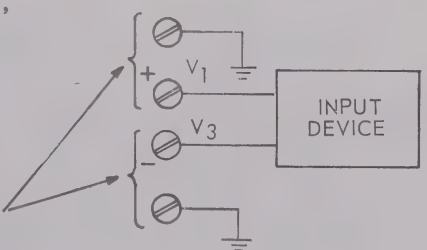
(2) Also called differential mode, transverse, series, and loop.

(3) Attenuated by amplifier input filter.



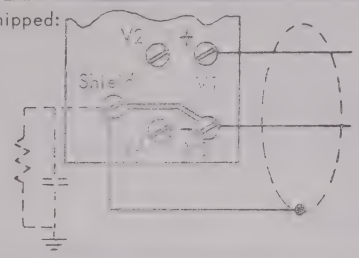
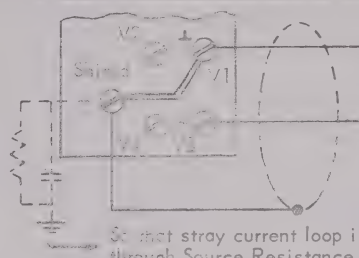
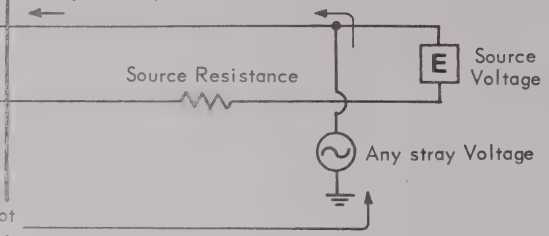
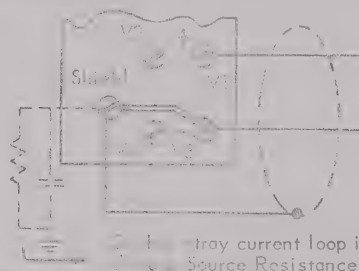
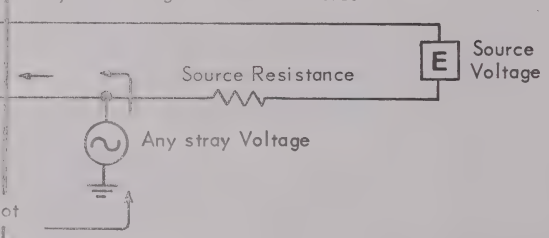
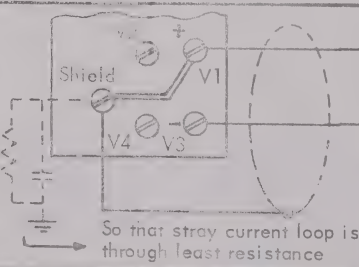
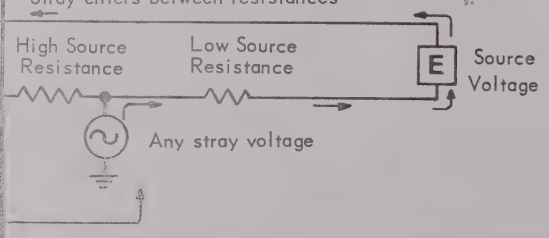
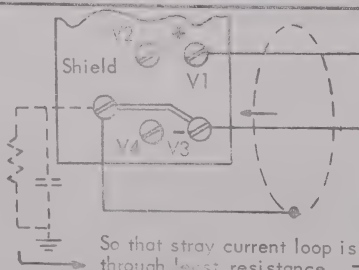
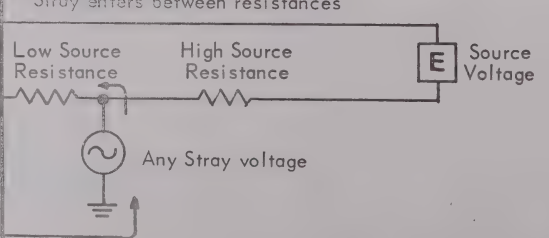
b. COMMON MODE

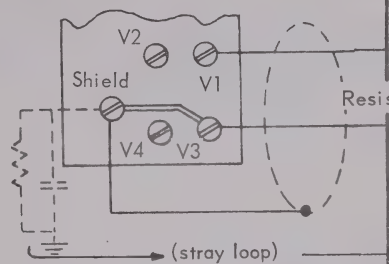
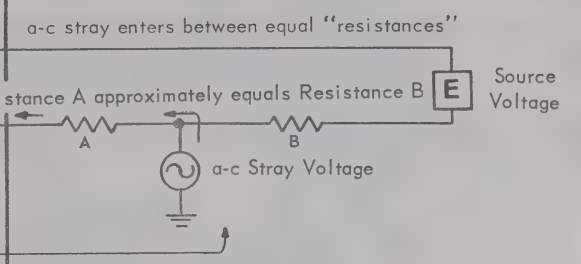
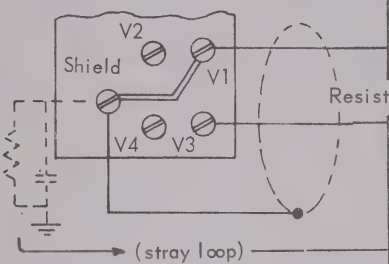
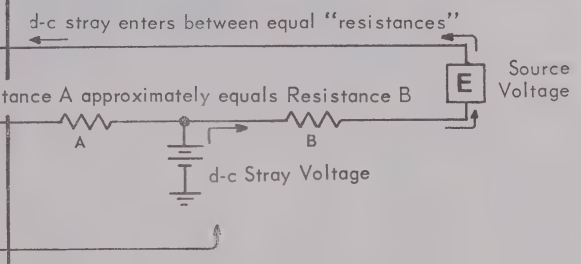
(1) That interference appearing as a voltage between input terminals and ground.



(2) Also called longitudinal (or stray-to-ground).

(3) When can't be rejected as shown in IDEAL SITUATION, shield jumper supplied on customer terminal panel (TB) is used to minimize the conversion of Common Mode to Normal Mode.

4. CONNECTION REQUIRED	FOR THESE CONDITIONS
As shipped: 	Whenever source impedance or resistance is less than 200 Ω, stray current will not affect instrument accuracy ratings. Above 200 Ω, accuracy ratings are affected but can be minimized as shown in conditions below.
 So that stray current loop is not through Source Resistance	Stray enters positive side of source. 
 tray current loop is not Source Resistance	Stray enters negative side of source 
 So that stray current loop is through least resistance	Stray enters between resistances 
 So that stray current loop is through least resistance	Stray enters between resistances 

CONNECTION REQUIRED	FOR THESE CONDITIONS
	
	
Try both, connect to the terminal that gives best results.	UNKNOWN

2

5. CONSIDERATIONS

a. In this instrument d-c stray is more critical then a-c, especially in high temperature and high humidity ambients.

b. Any stray voltage generated by d-c leakage through the signal source will be algebraically added to the input signal.

c. Although this instrument has a "floating shield," there exist inevitable ground "leaks" that will complete a "ground-loop".

d. Do not confuse "instrument-ground" (GRD) which ties the chassis to an earth connection (water-pipe-ground or earth-ground) with "signal-ground". We are defining "signal-ground" as "shield" and it should be floating fully insulated from "earth-ground." "SHIELD" is grounded only in IDEAL SITUATION, where Common Mode source can be grounded without adverse effects.

6. EXTREME PROBLEMS

a. **FOR D-C STRAY.** Keep instrument ambient temperature down, and atmosphere dry, free of moisture, steam, and condensation.

b. **FOR A-C STRAY.** When shield terminal cannot be used effectively as shown above, try a capacitor across input terminals when there is source resistance to short-circuit a-c Normal Mode. A pair of back-to-back Tantalum capacitors are preferred by some. Experiments can be made with filter circuits at the input terminals using values in relation to the actual input signal and the magnitude of the stray.

> Remember that any components added to the input will affect the dynamics of the servo, generally slowing the balancing speed.

ELECTRICAL ADJUSTMENT AND SWITCHES

Calibration Rheostat for certain Radiamatic Options. If you have this option, Operation is covered in CALIBRATION section 622.

On those models with Water Quality Actuation, further adjustments are discussed in CALIBRATION section 624.

Illumination switch for flourescent lighting option on Strip Chart models.

Illumination switch for flourescent lighting option on Circular Chart Circular Indicator models.

GAIN adjustment changes sensitivity to those input signals which are greater than 0.1% of full scale.
CLOCKWISE increases sensitivity.
COUNTERCLOCKWISE decreases sensitivity.

DAMPING (see next page)

On two servo instruments: Gain, span, and zero of that 2nd servo are in the same relative positions, but immediately below 1st servo.

CHART DRIVE POWER SWITCH on those models with TWO SPEED CHART DRIVE OPTION for either a 10 to 1 or a 60 to 1 jump in chart speed.

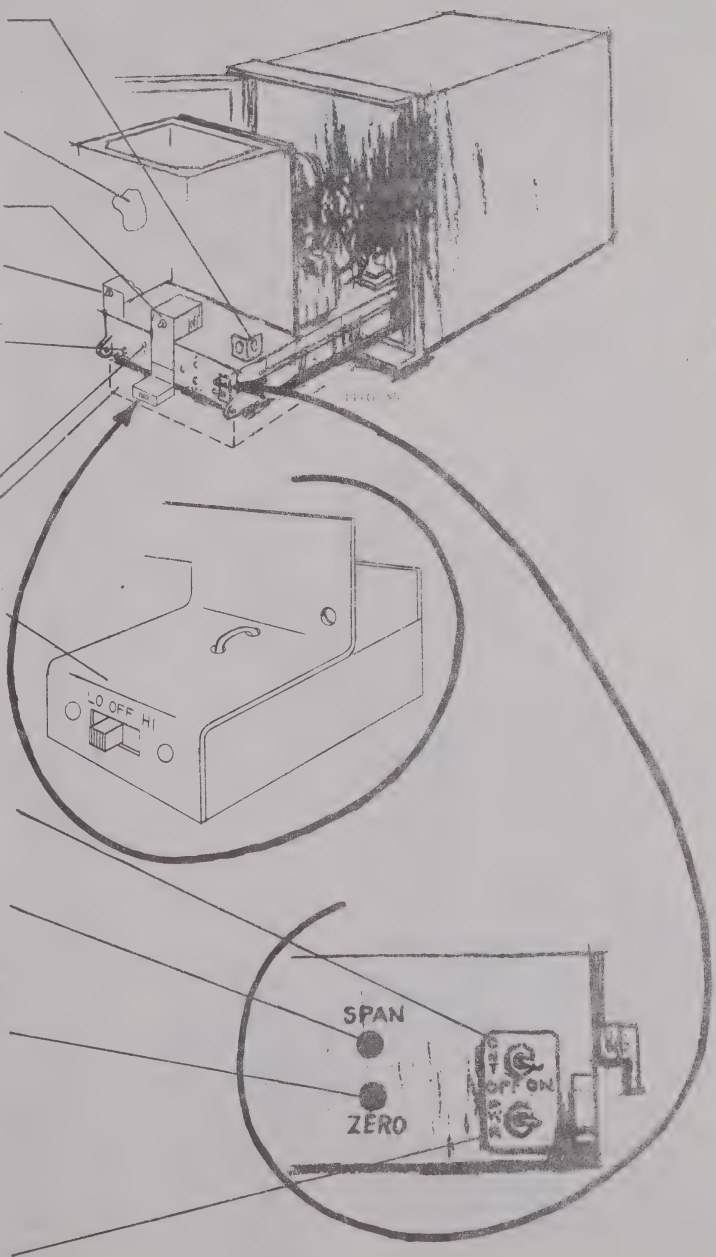
CHART DRIVE POWER SWITCH: optional on Pen Type instrument, standard on Multipoint type instrument. If this switch is provided on a Pen Type instrument, see CHART DRIVE SWITCH OPERATION in section 352 for further discussion.

SPAN adjustment provides a means of changing span up to 10% full scale.
CLOCKWISE will decrease span.
COUNTERCLOCKWISE will increase span.

ZERO adjustment produces linear shift of all points on instrument scale without changing span of instrument.
CLOCKWISE will shift points downscale.
COUNTERCLOCKWISE will shift all points upscale (to the right).

If this instrument has reverse actuation, clockwise will shift all points upscale (to the left). etc.

Instrument power (an option is also available for no power switch).



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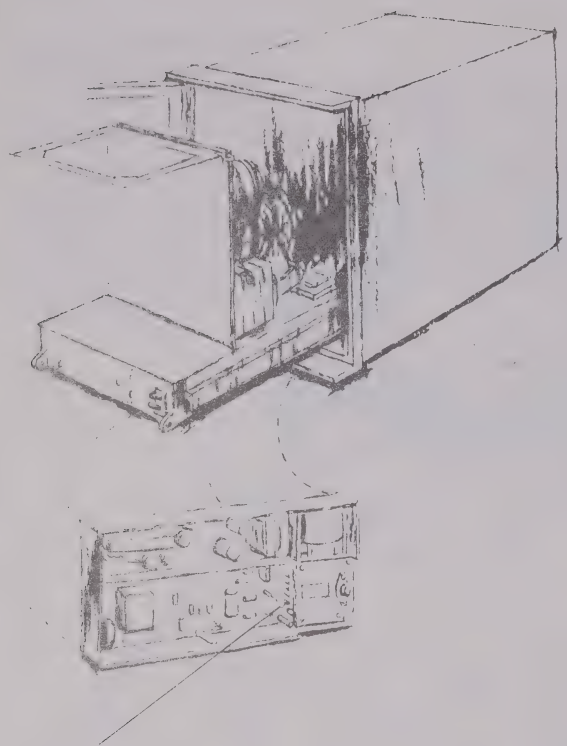


HI LO Gain Jumper. Position of gain jumper depends upon instrument span. In general, it should be connected to HI gain pin for an instrument span of less than 15 millivolts; and to LO gain pin for spans of more than 15 millivolts.

WARM-UP TIME

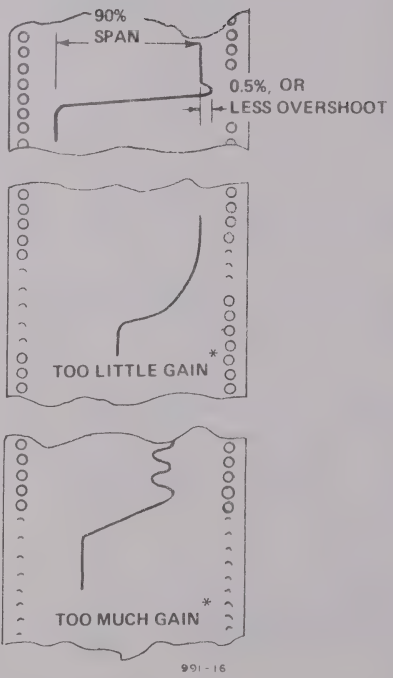
Switch on instrument power and allow instrument to warm up for at least 30 minutes to stabilize internal temperature and insure measurements obtained are within calibrated accuracy of instrument.

SHUTDOWN

For Pen Type instruments which will be shut down for a week or more, drain ink supply and flush out ink system with water to prevent ink drying in system.

GAIN

Optimum gain setting should give minimum or no overshoot (0.5%, or less) on a 90% full scale step change.



DAMPING adjustment is used on instruments with push-pull amplifiers (used for 1 second servo speed and/or spans of less than 5 millivolt) to change response speed of system.

CLOCKWISE reduces (dampens) overshoot, decreases response.

COUNTERCLOCKWISE reduces damping, increases response.

*Figure ignores any damping adjustment used on some models.

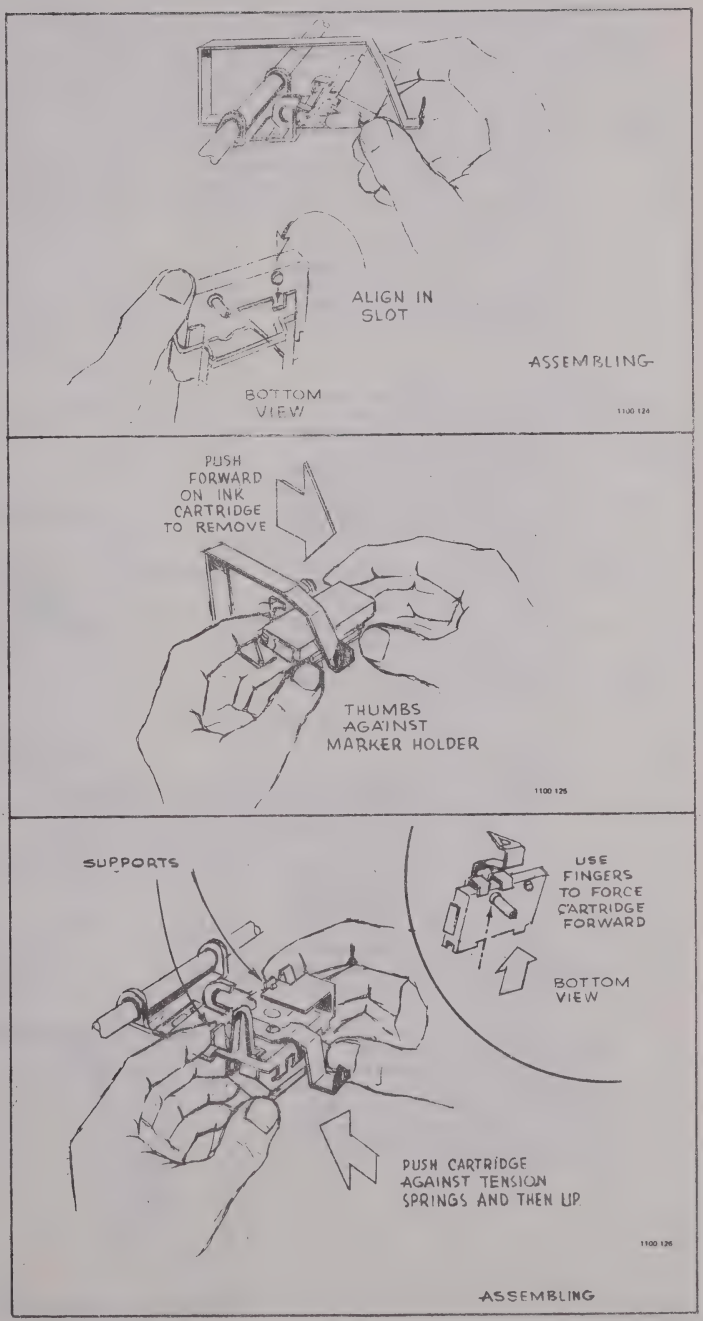
Instrument is shipped with cartridge holders installed and secured with tape. Ink marker cartridges are included in the accessory kit supplied with instrument. Remove tape from holder(s) and also from pen lifter rod(s) prior to starting cartridge installation. On two servo instruments, displace the carriages to obtain working room to install cartridges. The purple marker cartridge is only used on two servo instruments.

Install Red Marker:

1. Remove protective cap from fiber tipped marker.
2. Rest marker cartridge on top surface of #1 servo carriage assembly.
3. Slide cartridge straight back, guiding against left side and maintaining contact with top surface of holder.
4. Using both hands, grasp rear corners of holder with forefingers and use thumb to apply force to front edge of cartridge. Plastic tenon on lower side of cartridge must "snap" into slot in holder (interference fit).
5. Make sure lower surface of cartridge is in contact with upper surface of holder, cartridge tabs are secured under spring clips, and interference fit on plastic tenon is achieved.
6. Release #1 pen lifter to place marker in contact with chart; check adjustment of pen lifter as described below.
7. To remove old cartridge, rest thumbs on lower portion of holder, grasp rear corners of cartridge with forefingers and force cartridge toward you until free of spring retainers.

Install Purple Marker:

1. Remove protective cap from fiber tipped marker.
2. The purple marker cartridge (for #2 servo) is installed underneath the carriage assembly. Insert back tabs of cartridge into spring clips on holder and guide cartridge against left side of holder.
3. Using both hands, grasp rear corners of holder with forefingers and use thumbs to apply a rearward and upward force to front edge of cartridge.
4. When upper surface of cartridge is flush against lower surface of holder, move thumbs to front of holder. Spring clips will temporarily hold marker cartridge in position.
5. Seat marker cartridge by forcing toward you. Use forefingers to apply pressure on rear corners of cartridge and squeeze toward thumbs. Slot in holder provides



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interference fit with barrel of fiber tip marker.

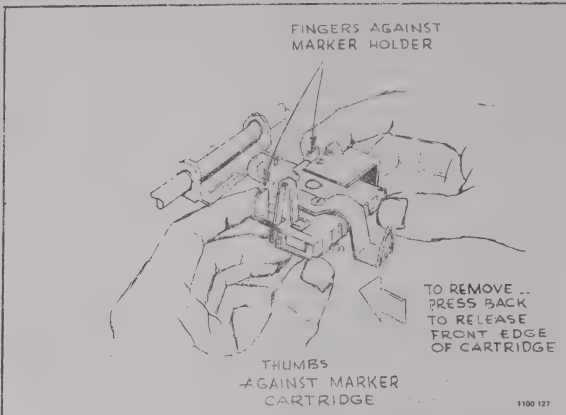
6. Make sure cartridge is fully forward in holder, upper surface of cartridge is in contact with lower surface of holder, tabs are secured by spring clips, and interference fit on marker barrel is achieved.
7. Release #2 pen lifter to place marker in contact with chart; check adjustment of pen lifter as described below.
8. To remove old cartridge, grasp rear corners of holder with forefingers, force cartridge back with thumbs, lower front edge to clear holder and bring cartridge forward with forefingers.

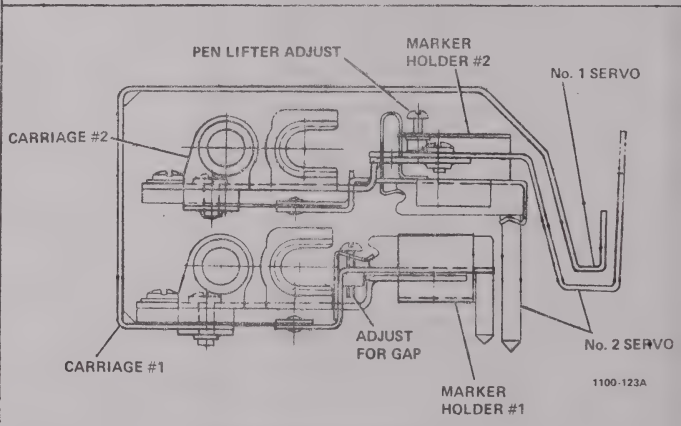
Check Pen Lifter Adjustment:

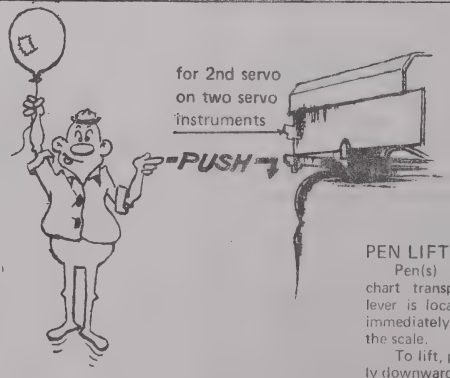
1. Pen lifter(s) are factory adjusted prior to shipment, however, a quick check is recommended after installing new marker cartridges.
2. Actuate pen lifter by pushing lever in until it locks; check for small air gap between marker tip and chart. This verifies that pen has been lifted from chart.
3. Raise lever and release pen lifter. With marker in contact with chart, check for small air gap between adjustment screw and marker holder assembly. This verifies that full weight of ink cartridge is applied to marker tip to maintain proper writing pressure.
4. Pen lifter adjustment is not required if some gap is observed in steps 2 and 3.
5. If necessary, turn adjustment screw clockwise to increase gap between marker and chart. Turn counterclockwise to increase gap between adjustment screw and holder.
6. On two servo instruments verify that both carriage assemblies can travel full scale without interference between markers, pointers or holders. Check for clearance with both pens recording, both pens lifted, and both combinations of one pen lifted.

To Order Replacement Cartridges:

Replacement cartridges are available in packages of 4 or 12. For Red Markers specify 30733241-1 (Qty. 4) or 30733241-3 (Qty. 12). For Purple Markers specify 30733241-2 (Qty. 4) or 30733241-4 (Qty. 12).


FINGERS AGAINST MARKER HOLDER
TO REMOVE -- PRESS BACK TO RELEASE FRONT EDGE OF CARTRIDGE
THUMBS AGAINST MARKER CARTRIDGE
1100 127





PEN LIFTER

Pen(s) lift automatically whenever chart transport is "OPENED". Manual lever is located on the front of chassis immediately adjacent to the left edge of the scale.

To lift, push it straight in, then slightly downward until notch engages.

To release, merely flick lever up. It will snap out.

COMMENTS

Adherence to a routine inspection and maintenance program will insure optimum instrument performance and should reduce servicing requirements to a minimum. The checks and maintenance procedures included in this section are recommended to supplement normal industrial cleaning procedures.

The frequency of periodic maintenance is a function of instrument operating time and span step response time (balance speed). For example, an instrument with a 5 second response time may require more frequent maintenance than one with a 15 second response time for the same number of operating hours. For continued satisfactory performance, establish a regular maintenance schedule in accordance with the instrument operating cycle. Include in the maintenance schedule the inspection of items such as relays, MICROSWITCH units, any gears and other moving parts.

You can perform some maintenance with the instrument in service; but for certain procedures such as performance checks, you will have to shut down the instrument.

Routine checks are tabulated in this section. Some procedures are given; others are cross-referenced to other sections of this manual.

CHECKS AND PROCEDURES

What To Do	When	How
Balancing Components		
1. Clean and lubricate gears behind slidewire.	1. Every 6 months.	1. See oiling points in following Maintenance Section 453. NOTE: The servo (balancing) motor is factory-lubricated and does not require periodic oiling. NOTE Do not oil slidewire drive cable. Wipe it off with a clean dry cloth to remove any oil or accumulated dirt.
2. Adjust sensitivity.	2. Monthy	2. Adjust gain; refer to OPERATION section 311.
3. Check deadband	3. Varies with type of use.	3. See Section 424 for CALIBRATION.
4. Check and clean rebalancing element (slidewire)	4. Every 6 months.	4. See REBALANCING ELEMENT (Slidewire) MAINTENANCE Section 446.
Recording & Indicating Components		
1. Change chart.	1. Tattle-track feature gives warning on standard strip chart. If preferred, duration of chart at selected speed can be calculated for single-speed chart systems and replacements made on periodic basis.	1. Refer to OPERATION section - 353.
2. Clean scale.	2. As required.	2. Use a soft cloth with a soap and water solution to remove dirt, grease, and ink. Do not use alcohol base solvents which may attack the lacquer finish of scale.
3. Check pen(s) trace for acceptable quality.	3. If pen exhibits excessive skipping, or trace is too light or too wide, replace marker cartridges.	3. Refer to OPERATION Section 353.

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What To Do	When	How
4. Check alignment of recording system.	4. When record does not coincide with appropriate chart graduations.	4. See SERVICE MANUAL 11-02-01.
5. Check chart drive system:	5.	5.
(a) Clean gears.	(a) As required.	(a) Use a stiff bristle brush and solvent.
(b) Lubricate	(b) Once a month.	(b) See oiling points in MAINTENANCE Section 453. Oil lightly using either Type L-1* or equivalent high grade instrument oil. NOTE: The chart motor is factory lubricated and does not need periodic oiling, however, the external drive pinion is not sealed and should be lubricated as part of the chart drive system.
** supplied in accessory kit.*		

WARNING ON CARE IN CLEANING

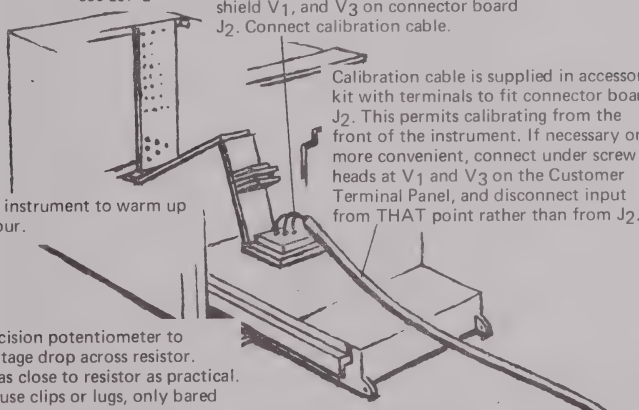
There are many polycarbon components used in this instrument because of their durability and ability to hold precise tolerances over a long life. The material also does not "outgas" onto electrical contacts, etc., making it invaluable as supporting members around electrical and electronic components.

However, to protect these components do not use chlorinated solvents in cleaning. If such a solvent should splash onto these components, it will make them brittle and easily damaged. Therefore do not use anywhere inside the instrument such solvents as carbon tetrichloride, trichloroethane, and "Freon"-TMC (an azeotrope "Freon"-TF and methylene chloride).

When a solvent is needed at all, we recommend "Freon"-TF (trichlorotrifluorethane).

D-C VOLTAGE AND TACHOMETER ACTUATIONS

CAUTION: Dangerous stray voltages can exist. Before touching connections, turn off power and check each terminal with a multimeter. For best results check alignment of pointer, chart, etc., before calibrating. (See Service Manual 11-02-01.)


990-207-2
Disconnect input wires from terminals shield V_1, and V_3 on connector board J_2. Connect calibration cable.
Calibration cable is supplied in accessory kit with terminals to fit connector board J_2. This permits calibrating from the front of the instrument. If necessary or more convenient, connect under screw heads at V_1 and V_3 on the Customer Terminal Panel, and disconnect input from THAT point rather than from J_2.
Allow instrument to warm up 1/2 hour.
Use precision potentiometer to read voltage drop across resistor. Attach as close to resistor as practical. Do not use clips or lugs, only bared wires.
If cable is lost, use twisted copper wire. Very narrow span millivolt actuations may require a two wire shielded cable. Only copper wires and shield are acceptable. Connect SHIELD to V_3.
Construct a voltage divider using laboratory type precision resistors (0.05% or better) with values appropriate for your instrument span. This will permit you to read on the precision potentiometer a convenient proportion of the total input voltage.
Observe polarity: V_1 is +, V_3 is −.
d-c laboratory bench supply
(Same as instrument ground)
1100-90

This ElectroniK instrument has been inspected, adjusted, and calibrated before it leaves the factory. While instrument is ready for use when received, the following adjustments may be necessary from time to time.

Open instrument door, release latch and pull out the chassis, see Figure 1.

Release latch on both sides of the chart transport and remove chart transport, see Figure 2.

Switch on instrument power and allow for a short warm up period.

PRIMARY CHECKS

Check alignment of indicating pointer. Drive pointer downscale and note the point on the scale at which it drives against the stop. Drive pointer upscale and do likewise. These noted check points should be equidistant from the stops at zero and one hundred percent of scale. If they aren't, loosen the screw where the drive scale is connected to the carriage assembly and realign the pointer.

On multipoint recorders only, switch on the chart and print drive mechanism. When the selector switch arrives at the point/record that is to be calibrated; turn off the chart and print drive switch. This will cut out the print mechanism but still permit the carriage assembly to be driven up or downscale by the servo drive motor. Disconnect the thermocouple input leads of this point/record from terminal board TB3 at rear of the case. Connect a precision voltage source, such as J.G. Biddle Co. "Versapot" or similar portable potentiometer, to these two input terminals. Check for correct polarity which is indicated on terminal board TB3. The negative lead of extension wire is color coded red. The instrument servo and measuring circuit will now respond to this one input only. Any variable input from the portable test potentiometer will drive the indicating pointer up or downscale.

REFERENCE JUNCTION

The reference junction temperature compensator, on thermocouple actuated multipoint recorders, is a winding of copper wire around the anodized aluminum center section of the process input terminal panel TB3. See Figure 3.

The aluminum block provides equal ambient temperatures from Point 1 through Point 24. This temperature reference winding is then connected to terminal panel TB1 by a 2-wire cable; white/green to V4 and white/grey to V2. From TB1, it is then routed to instrument measuring circuit unit.

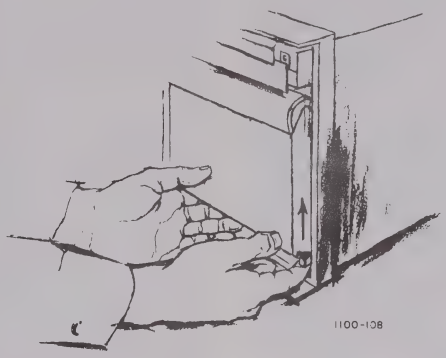


Figure 1- Release Chassis Latch, Pull out Chassis

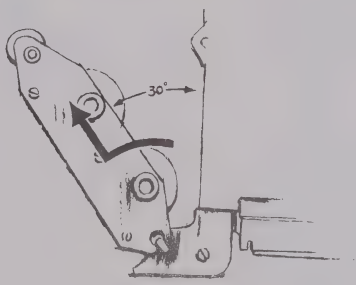


Figure 2- Remove Chart Transport

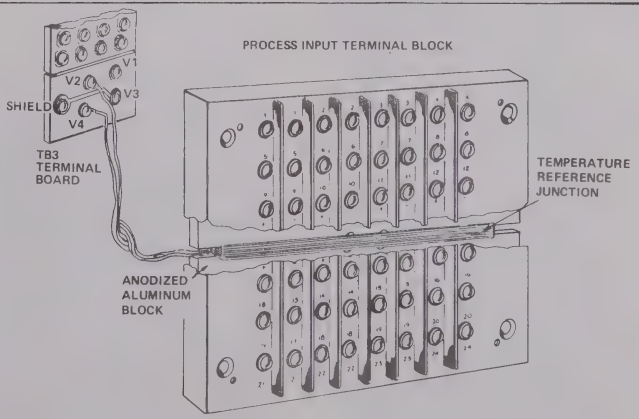


Figure 3- Process Input Terminal Block TB-3

CHECK DEADBAND

1. Set the amplifier gain adjust in full clockwise position see Figure 4. Supply an input signal to the recorder and adjust amplifier gain until pointer stops oscillating.
2. Set the stepping switch of the portable pot to a millivolt output equal to 50% of range span. Note the position of pointer on scale. Turn the stepping switch to drive pointer upscale and slowly return it to its original set millivolt position. Note the position of pointer on scale. If the difference between the two points (deadband) exceeds 0.1%, increase amplifier gain (clockwise adjustment).
3. With the stepping switch still set at 50% of range span, drive the pointer downscale and return it to its original set millivolt position. Note the position of pointer on scale. Deadband should be less than 0.1% of full scale.

CALIBRATION, MULTIPOINT INSTRUMENTS ONLY

After wiring the instrument to a portable test pot as described in a previous "Calibration Preparation" section, allow the instrument a short warm up period.

4. Determine the calibration check points at 10%, 50% and 100% of range span or the nearest cardinal point on instrument scale close to these reference points.
5. Refer to conversion table of Temperature Vs. EMF (IPTS-68) or Honeywell Manual 892-2 and determine the millivolt equivalents (EMF) of these temperature points.
6. Note the thermocouple reference junction temperature on the mercury in glass thermometer and determine the millivolt equivalent.
7. Algebraically, subtract the millivolt equivalent of thermocouple reference junction temperature from the 10%, 50% and 90% of span reference points.
8. Supply an input signal from portable pot to recorder equal to 10% of scale. If pointer is not at 10%, adjust zero pot until it is, see Figure 4.
9. Supply an input signal equal to 90% of scale. If pointer is not at 90%, adjust span pot until it is, see Figure 4.
10. Repeat steps 8 and 9 until calibration is within ± 0.3% of range span.

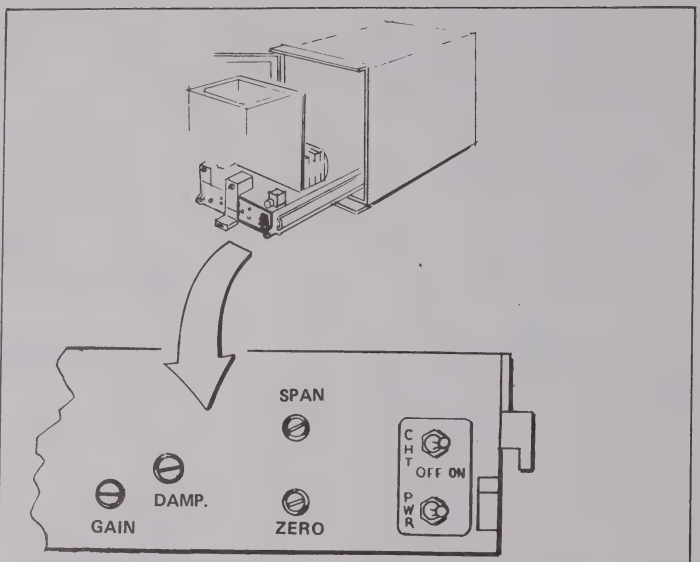
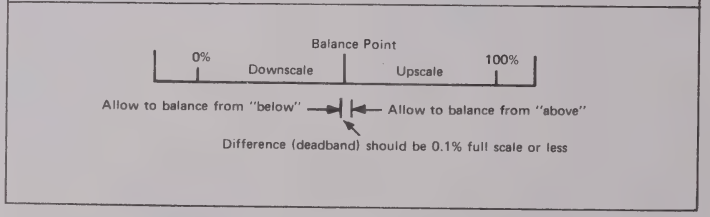


Figure 4- Position of Amplifier Gain Adjust



Example:

Range 0 to 1000°F (J)

Reference Junction Temperature 75°F or 1.22 mV			
% Span	Temp.	EMF	mV Inputs
10%	100°	1.942mV	0.722
50%	500°	14.108mV	12.888
90%	900°	26.396mV	25.176

424-0001-110

CALIBRATION, ONE & TWO PEN RECORDERS, WITHOUT BURNOUT

1. Check instrument calibration by applying voltages corresponding to several cardinal points on the scale. If instrument calibration is within ±0.3% of full scale or 20 microvolts (whichever is greater) calibration is satisfactory; if not, proceed as follows:
2. Set voltage source to a value which corresponds to about 10% full scale voltage equivalent to instrument span.
3. Adjust zero potentiometer until instrument balances at that same position.
4. Set voltage source to a value which corresponds to about 90% full scale voltage equivalent of instrument span.
5. Adjust span potentiometer until instrument balances at that scale point.
6. Continue adjusting span and zero until calibration is within ±0.3% full scale.

BURNOUT CAN CAUSE ZERO SHIFT

Some Millivolt, thermocouple, and Radiamatic actuations can have a "burnout" option. In ElectroniK potentiometers with burnout, the resistor burnout signal causes the pen to drive to one end of the scale should the input circuit open. The burnout signal is superimposed on the input signal and causes an offset from zero. Readjusting zero will compensate for this offset.

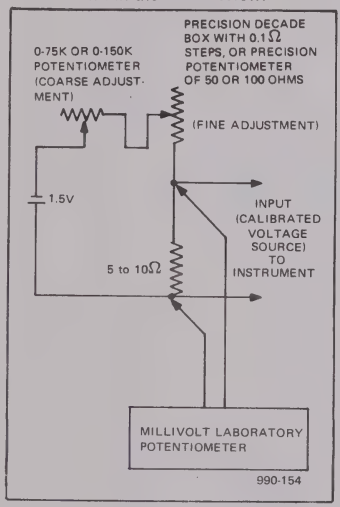
The magnitude of the zero offset caused by the burnout signal current flowing through the external circuit (source) resistance depends on two factors: (1) instrument span, and (2) external and/or the higher the external resistance, the greater the zero offset.

In calibrating those potentiometers having burnout, a difference in the resistance between the calibration equipment and the actual input source (e.g., thermocouple and extension wires) can introduce a zero offset error proportional to the magnitude of the difference in resistance. Portable laboratory potentiometers normally used for such calibration do not have a fixed output resistance. The resistance at the output terminals varies depending upon the millivolt setting. Such differences within the instrument range create difference in zero offset at the calibration points due to burnout. The difference in zero offset may be significant with narrow spans or with portable potentiometers having high internal resistance.

CALIBRATION WITH BURNOUT (Method A)

Accurate calibration can be obtained with this method regardless of the variations in resistance of the precision voltage source (usually a portable potentiometer) used for calibration.

1. Adjust the amplifier for optimum sensitivity.
2. Connect a precision voltage source as shown in the CALIBRATION PREPARATION section. If a commercial run up box* is used, be sure that it is a type having a FIXED resistance of 100 ohms or less at the output terminals. If a fixed resistance type is unavailable, then one may be constructed as shown in the sketch below.


PRECISION DECADE BOX WITH 0.1Ω STEPS, OR PRECISION POTENTIOMETER OF 50 OR 100 OHMS
0-75K OR 0-150K POTENTIOMETER (COARSE ADJUSTMENT)
(FINE ADJUSTMENT)
1.5V
INPUT (CALIBRATED VOLTAGE SOURCE) TO INSTRUMENT
5 to 10Ω
MILLIVOLT LABORATORY POTENTIOMETER
990-154

3. Temporarily connect a millivolt laboratory potentiometer and adjust the precision voltage source to a desired value.
4. Disconnect the millivolt laboratory potentiometer and proceed with calibration as described above for instruments without burnout
5. When completed, use this precision voltage source to supply a signal to cause the instrument to read at some convenient point on scale. Note that point.
6. Now add in series with this precision voltage source, a resistance equal to the resistance of the external circuit normally connected to the instrument (add the resistance of the sensing unit and connecting wires). This will most likely cause a zero shift in the same reading (taken in step 5).
7. Adjust instrument zero to read again the value noted in step 5.
8. Remove all calibration equipment.
9. The instrument is now calibrated AND adjusted for the burnout resistance.

Also called start-up box by some.

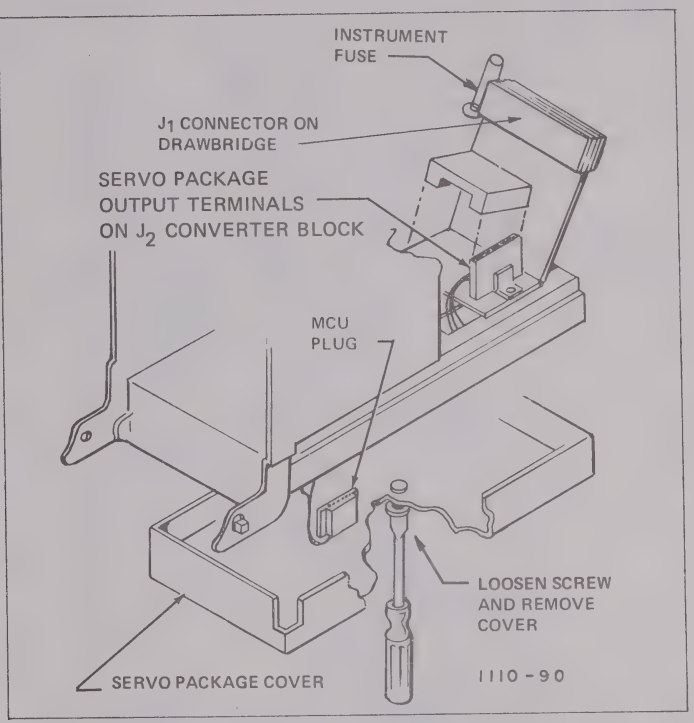
CALIBRATION WITH BURNOUT (Method B)

This method partially compensates for variations in zero shift within the instrument range caused by differences of internal resistance between dial settings of the precision voltage source (usually a portable potentiometer). With wider instrument spans or lower resistance of the calibration potentiometer (precision voltage source), inaccuracy due to zero shift may be negligible.

1. Adjust amplifier gain for optimum sensitivity.
2. Connect the precision voltage source as shown in the CALIBRATION PROCEDURES section. Set it for a value equivalent to the approximate midpoint of the instrument range.
3. Disconnect the battery from the precision voltage source, measure, and note the resistance of the output terminals of the calibration setup.
4. Reconnect the battery and calibrate as described above for instruments without burnout.
5. When completed, use the precision voltage source to supply a signal to cause the instrument to read approximately the midpoint of scale. Note the value.
6. Measure the resistance of the external circuit normally connected to the instrument (sensing unit and connecting wires). Find the difference between this resistance and the resistance of the calibration setup as found in step 3.
7. Add a resistance approximately equal to this difference (step 6) in series with the calibration setup. Note the amount of offset compared to reading in step 5.
8. Remove series resistance and allow instrument to return to midpoint reading observed in step 5.
9. To correct for offset, adjust instrument zero from reading observed in step 5. by an amount equal to the offset:
   - If resistance of external circuit is HIGHER than that of calibration setup, shift zero DOWNSCALE.
   - If resistance of external circuit is LOWER than that of calibrating setup, shift zero UPSCALE.
10. Remove all calibration equipment.
11. The instrument is now calibrated and adjusted for burnout resistance.

TO EXPOSE SERVO PACKAGE

Servo package is under chassis. To expose components, loosen captive screw in center of cover, then remove cover.



TO REMOVE SERVO PACKAGE

It is not necessary to remove servo package to change measuring circuit unit, constant voltage unit, or most other components. Nevertheless some will find removal convenient.

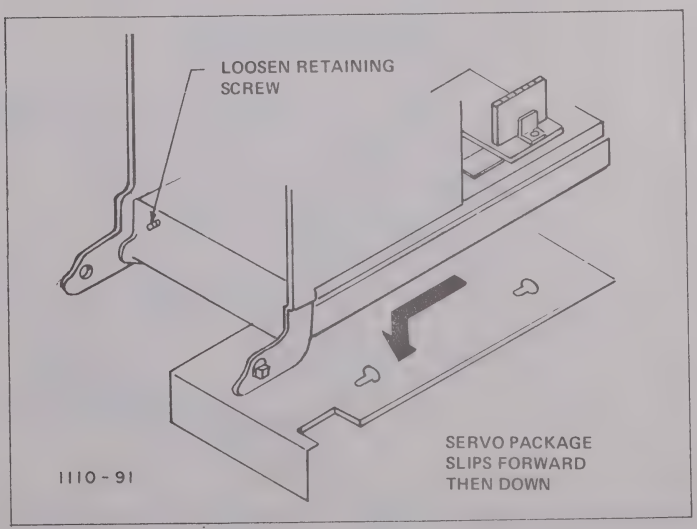
1. Disconnect servo package output terminals from J_2 connector block on rear deck of chassis.
2. Disconnect plug to measuring circuit unit (MCU) in front right corner of servo package.
3. Loosen retaining screw to permit servo package to slide forward to clear keyhole slots, then package will drop free.

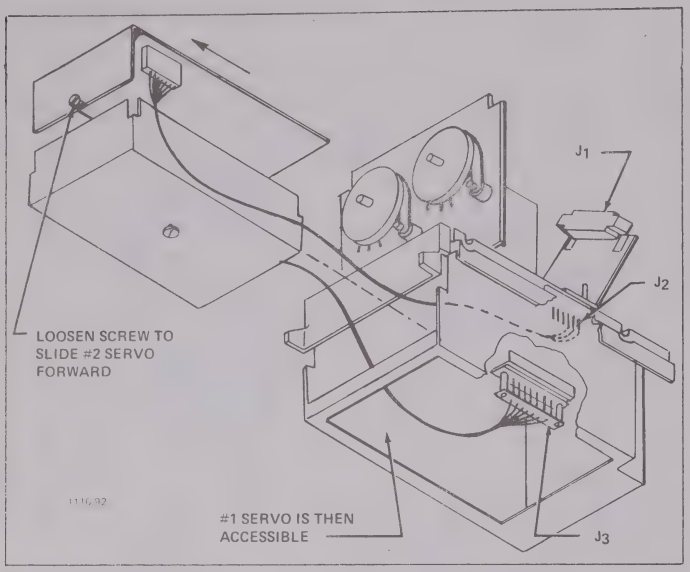
SERVO PACKAGE COMPONENTS

Illustration on next page shows standard orientation of components in the servo package:

- Measuring Circuit Unit (MCU)
- Constant Voltage Unit (CVU)
- Power Transformer
- Amplifier Board

For further details, see parts list.





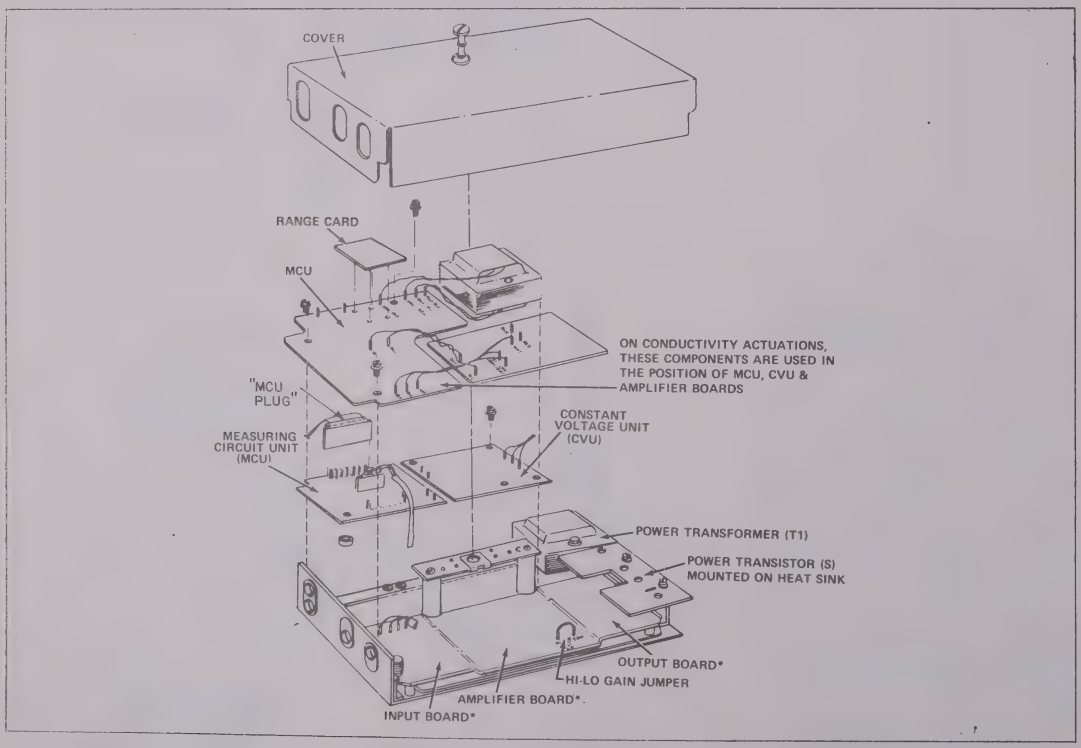
TWO SERVO MODELS

Number 2 servo package is lowermost, so remove cover for access same as above.

TO COMPLETELY REMOVE #2 PACKAGE: remove cover, disconnect MCU plug, disconnect output cable from J3 connector.

TO GAIN ACCESS TO #1 PACKAGE: loosen screw on bottom front of chassis, slide package forward as a drawer to clear the #1 servo package. No need to disconnect #2 package. Remove #1 package as explained above.

TO REMOVE #1 PACKAGE: slide #2 package forward, disconnect and remove #1 package as explained above.



These components are three boards on push-pull amplifier versions (used for one second servo speeds and/or spans of less than 5 millivolts) they are one board on single end amplifiers.

INTRODUCTION

WIPER ARM ASSEMBLY

The arm consists of a contact wiper and collector coil. The four-fingered contact is gold alloy and is fused to the end of contact arm. The spiral collector coil provides an electrical connection between the wiper contact and collector terminal. The collector coil and the four fingered contact on the wiper arm assembly are fragile and can easily be disfigured. Handle with care.

WIREWOUND SLIDEWIRE

The winding of the slidewire is made of platinum alloy to resist corrosion and shunted with manganin wire. There are approximately 2550 convolutions that provide high resolution.

CONDUCTIVE PLASTIC SLIDEWIRE

Conductive plastic is a hard, wear resistant, chemically inert plastic track bonded to an insulator base. It is more precise (better resolution) than a wirewound slidewire and generates less noise. The large cross sectional area of conductive plastic will not develop opens or shorts. It requires little or no maintenance.

WARNING: Guard against excessive wiper current during installation or removal of plastic slidewire. Current in excess of 10 milliamperes will destroy the conductivity of plastic strip. A (V.O.M.) Volt, Ohmmeter is used during the installation procedure. If you are not sure of current draw of your meter, place a current reading meter in series with V.O.M. Move selector switch through various resistance ranges to determine the short circuit current of each range and use the range that draws less than 10 milliamperes of current. OTHER TESTING PRECAUTIONS can be found at the end of this section.

CLEANING

Under normal operating conditions, the slidewire or plastic strip does not require any maintenance. However, if instrument doesn't operate properly and a dirty slidewire or plastic strip is suspected, proceed as follows:

1. Turn off all power to instrument.
2. Either remove plastic cover (common mode barrier), or remove lower right screw and lift barrier aside.
3. Remove red, white and black leads to terminal connectors.
4. Refer to warning at beginning of this section regarding plastic slidewires. Refer to Figure 2 and connect one ohmmeter lead to collector terminal of slidewire and one lead to terminal designated as zero percent of range span.

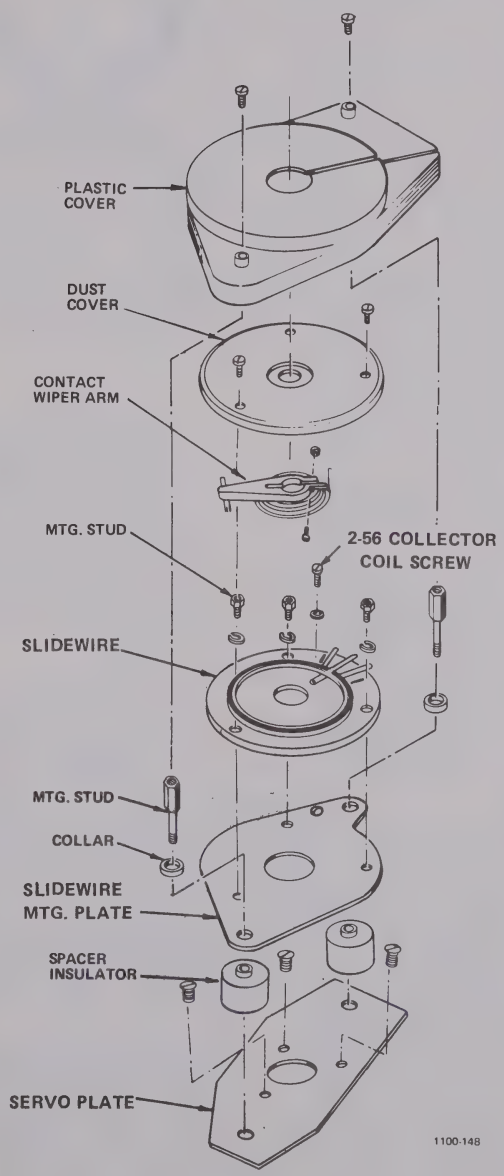
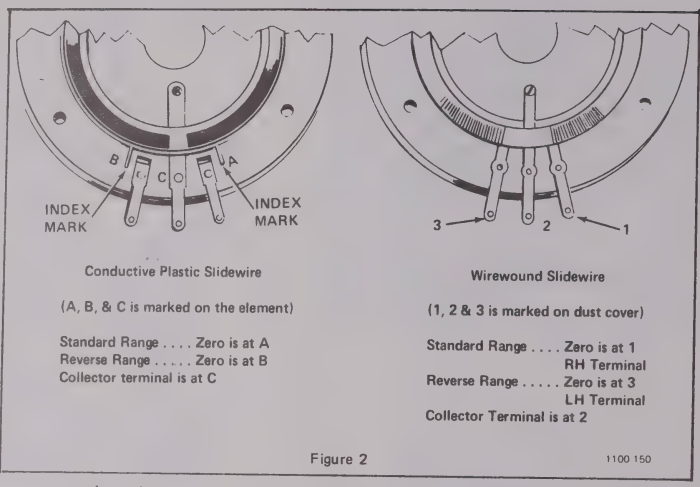


Figure 1

5. Turn bull gear through its full travel from stop to stop. Ohmmeter will fluctuate at dirty spots and even show an open circuit.
6. If element is dirty proceed to FRONT SERVO DISASSEMBLY section that follows.

FRONT SERVO DISASSEMBLY

1. Disconnect all power to instrument.
2. Release chassis latch, pull out chassis, remove chart transport and remove or lift up top cover of chassis.
3. Rotate bull gear until cable drum set screw is topside. Loosen set screw. Move bull gear fully clockwise so that carriage fastening point on drive cable is at extreme left of scale. Apply strips of masking tape over top of cable drum groove and down cable drum sides to hold cable in place. Slide cable drum off servo shaft and move drum to left out of way.
   NOTE: Step 3 may be difficult to perform on 2-pen recorders. If cable drum and drive cable cannot be moved to a point that will permit removal of either slidewire from servo shaft, then the drive cable must be disconnected from cable drum and pulleys.
4. Remove plastic cover (common mode barrier) and dust cover from slidewire. Remove red, white and black input leads from connector terminals by pulling on lead wire lugs. DO NOT PULL ON LEAD WIRES. Disconnect blue wire from mounting plate.
5. Turn bull gear so contactor on wiper arm is at 10 o'clock on face of slidewire element.
6. Loosen the 2-56 binding head screw at top of collector terminal. Turn bull gear counterclockwise and the looped end of wiper arm coil will move off the 2-56 mounting screw. Some early versions had a ring at end of coil. In this case, remove the 2-56 binding head screw entirely.
7. Loosen the capscrew, that locks wiper arm to servo shaft, with bristo wrench 30360711-001. Place small screwdriver between top of wiper arm and inner part of plastic base of element. Pry wiper arm away from plastic base of slidewire as far as you can with a small screwdriver. Grasp wiper arm with either hand and pull it off servo shaft . . . gently.
8. Disconnect 3 hex head mounting studs and remove slidewire element from mounting plate.
9. Remove remaining 2 hex head studs, collars, spacers and the slidewire mounting plate.
10. Thoroughly clean area. Use Chlorothene-Nu on unpainted surfaces and warm water with a mild detergent on painted and plastic surfaces.



Conductive Plastic Slidewire

(A, B, & C is marked on the element)

Standard Range . . . . Zero is at A
Reverse Range . . . . . Zero is at B
Collector terminal is at C

Wirewound Slidewire

(1, 2 & 3 is marked on dust cover)

Standard Range . . . . Zero is at 1 RH Terminal
Reverse Range . . . . . Zero is at 3 LH Terminal
Collector Terminal is at 2

Figure 2 1100 150

MAINTENANCE

WIPER ARM ASSEMBLY

1. The collector coil and four fingered contact on the wiper arm assembly are delicate and easily disfigured components of servo rebalancing circuit. Handle with care.
2. Do not lift the wiper contact by hand, bent wiper fingers will result in poor contact between wiper and plastic strip.
3. Clean the wiper by placing a piece of bond paper between wiper contact and plastic strip and turning the bull gear back and forth.

CONDUCTIVE PLASTIC SLIDEWIRE

Clean the conductive plastic element with alcohol or "Freon"-TF. Do NOT use any chlorinated solvents such as Chlorothene-Nu or "Freon"-TMC. Apply alcohol with a commercial applicator such as a mini-wipe, or use a lint free cloth. Air dry element.

WIREWOUND SLIDEWIRE

1. Clean the wirewound slidewire with a clean bristled (nylon) brush. Do NOT use a metal or fibre glass brush. See Figure 3 .

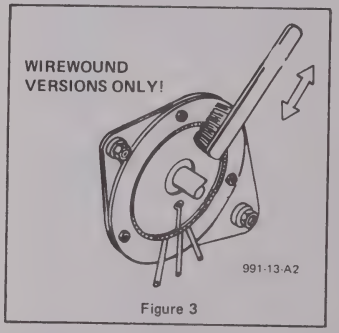


Figure 3

2. Brush the conductive element in the direction of the wire windings.
3. If slidewire is exceptionally dirty, use a spray type solvent like "Freon"-TF. Do NOT use any chlorinated solvents such as Chlorothene-Nu or "Freon"-TMC. If a spray is not available; use alcohol. Air dry the element, do NOT use paper or cloth towels or applicators.

INSTALLING PLASTIC OR WIREWOUND SLIDEWIRE

NOTE: The following procedure is common to both conductive plastic slidewire and wirewound slidewire. Where it differs, the reference to wirewound slidewire will appear in **BOLD** type.

1. Attach the plastic spacers and collars to slidewire mounting plate, see Figure 1 , and fasten to instrument chassis with three small hex head studs and lockwashers, tighten studs.

2. Affix slidewire element to mounting plate with three small hex head studs and lockwashers, semi-tight.
3. Position slidewire centering tool, see Figure 4 , on the servo drive shaft, bevelled end toward slidewire. Slide tool along shaft and up against center of slidewire assembly. The bevelled nub will center slidewire.
4. Tighten three mounting studs and remove centering tool.

INSTALLING CONTACT WIPER ARM

1. Rotate servo drive shaft counterclockwise until bull gear hits the stop.
2. Loosen the 2-56 binding head screw on slidewire collector terminal. Push wiper arm assembly on servo shaft (collector coil side first) so wiper arm is positioned at 7 o'clock, close to, but not on the conductive element.
3. Position wiper close enough to allow collector coil to be connected to collector terminal and yet not allow wiper to make contact with conductive element. Turn bull gear in clockwise direction until the looped end of collector coil comes to a stop against the 2-56 screw on terminal collector. Tighten the 2-56 binding head screw while holding collector spring against center section of slidewire with your left thumb. This will prevent distorting collector coil. The coil should not touch servo shaft.
4. Turn bull gear in clockwise direction against the zero stop.
5. With conductive plastic slidewire, align contact wiper with index mark at "A" or "B" on slidewire moulding. See Figure 2 . (At "A" for standard range; at "B" for reverse range.)
   With wire wound slidewire, set contact wiper equidistant from zero end and 100% end of slidewire winding.
6. At this point, take wiper contact (pressure) adjusting tool, see Figure 5 , 30679100-001 and turn knurled knob tight against locking end of tool. Then back it off one full turn.
7. Push adjusting tool on servo shaft; close to, but not on wiper arm. See Figure 5 . Tighten the two clamp screws.
8. See Figure 2 and connect one ohmmeter lead to collector terminal and one lead to either of other terminals (marked "A" &

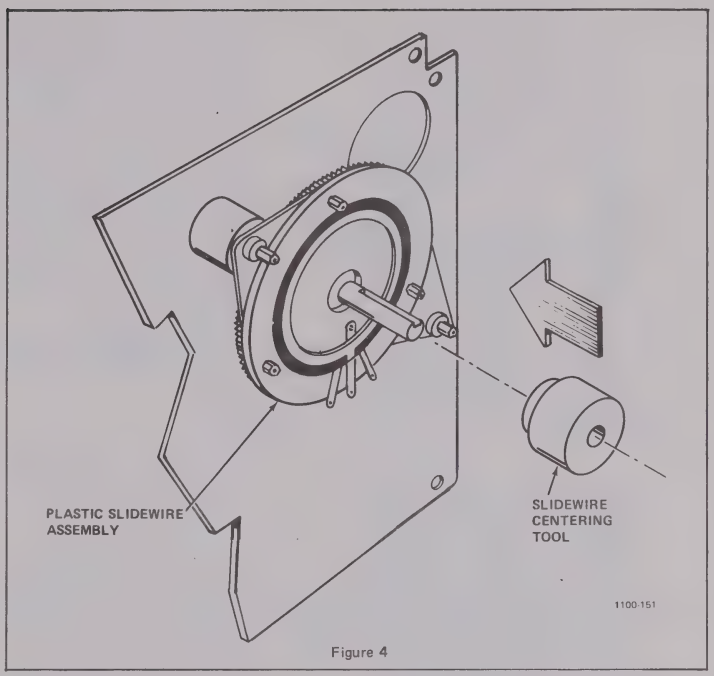


Figure 4

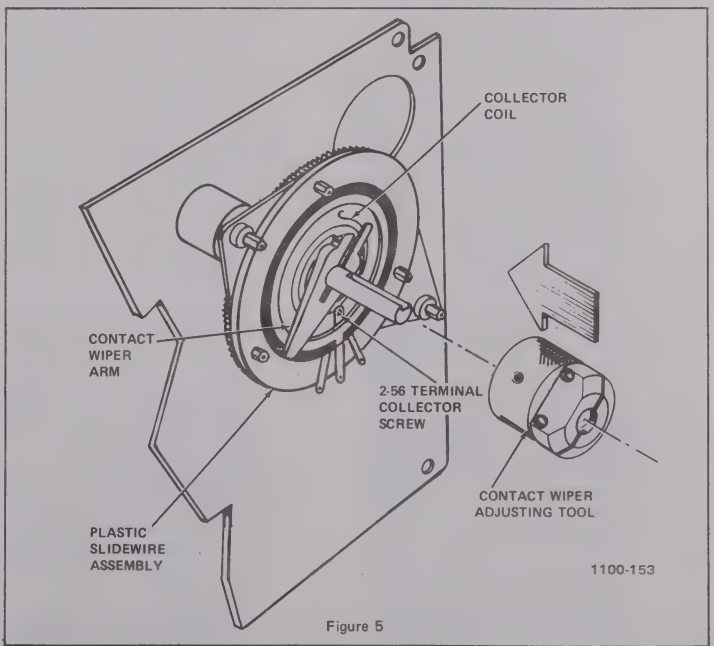


Figure 5

"B" on plastic slidewire and **1 & 3 on wire wound slidewire cover).**

9. Turn knurled knob of brass adjusting tool clockwise with one hand while holding the slotted end of tool firmly in place with other hand until contact with the slidewire is indicated on ohmmeter.
10. Turn the knurled knob one additional full turn. This will provide accurate wiper deflection of 0.050 inches and 20 grams contact pressure.

Hold the bull gear against the zero stop and gently move the contact wiper on the wirewound slidewire until you read 15 ohms ±5 on VOM.

11. Grab the slotted end of the adjusting tool and rotate the contact wiper through it's full travel. Be sure the wiper arm does not make contact with the 2-56 binding head screw that connects the collector coil and the collector terminal. Tighten the cap screw at the base of the wiper arm with bristo wrench 30360711-000.
12. Remove wiper adjust tool.
13. See Figure 2 and connect black lead to zero terminal and white lead to (center) collector terminal. The red lead goes on the remaining third terminal and corresponds to 100% of range span. The blue lead is screwed to slidewire mounting plate with a 4-40 binding head screw.
14. Replace dust cover and plastic (common mode barrier) with 4-40 binding head screws. The plastic cover provides protection from shock caused by a difference of potential between the slidewire cover and the case.
15. Grab the taped cable drum and drive cable and move it toward servo shaft. Line it up with and push it on shaft. Turn bull gear until slot in servo shaft is topside. Align drive cable with pulleys on instrument side plates. Tighten set screw on cable drum, making sure the set screw seats itself in slot of servo shaft. Remove tape from cable drum and drive cables.
    NOTE: On multipoint recorders, the cable drum must be mounted on outermost part of servo shaft to clear the plastic cover on slidewire assembly. This will cause the drive cable to be offset at an angle with the idler pulleys on chassis side plates. Turn bull gear through its full travel and check clearance between cable drum and cable connecting bracket on carriage assembly. It will be narrow. If cable drum obstructs upscale movement of carriage assembly, loosen set screw in cable drum and push drum closer to the plastic cover. Tighten set screw and check again for adequate clearance.
16. Replace/close chassis top cover. Turn on power and check calibration.

OTHER TESTING PRECAUTIONS FOR CONDUCTIVE PLASTIC SLIDEWIRES

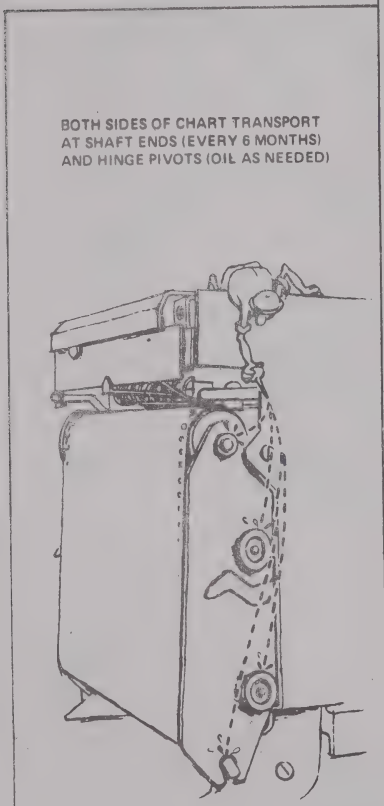
1. Never apply a voltage to the wiper terminal.
    a. "Ohmmeters" built into hand set volt-ohmmeters, when used on the lowest scale, apply a voltage without current limitation and must not be used to locate taps or end points.
    b. In connecting the potentiometer, first be sure to identify the wiper terminal or lead, and connect it only to high impedance measuring circuits.
    c. Guard against shorting the wiper to an end terminal. If the end terminal is energized, the wiper will also be energized. Extreme care should be exercised to avoid accidental shorts when using alligator clips.
2. Guard against excessive wiper current in the test circuit.
    a. A capacitor between the wiper and any part of the power source acts as a dead short to an instantaneous change in voltage. Such a surge can occur when continuity between the wiper and resistance element is broken, or when a power switch is thrown.
    b. Some load impedances change sharply. A lamp should not be used for checking continuity. For instance a 1 watt 110V incandescent bulb draws a large multiple of its nonimal 9 Ma when it is first energized.
3. Check permissible maximum excitation voltage on the end terminals, considering not only the track resistance and power rating, but also the added effect of load current.
4. Guard against internal arcing caused by:
    a. Discharging of capacitors.
    b. Surges due to inductive loads.
    c. Constant current supplies with high open circuit voltage.
5. When testing linearity or conformity be sure to mount the potentiometer so that no significant mechanical eccentricity errors are introduced into the shaft position measurement.
6. When measuring output, use a nulling method or a ratiometer whenever possible. A voltmeter may act as a significant load and may affect the output reading.

LUBRICATION

Use the high grade instrument oil supplied with the accessory kit.

Wipe away any accumulated dirt from bearing surfaces before application of oil.

Oil lightly at all points indicated in the following illustration.



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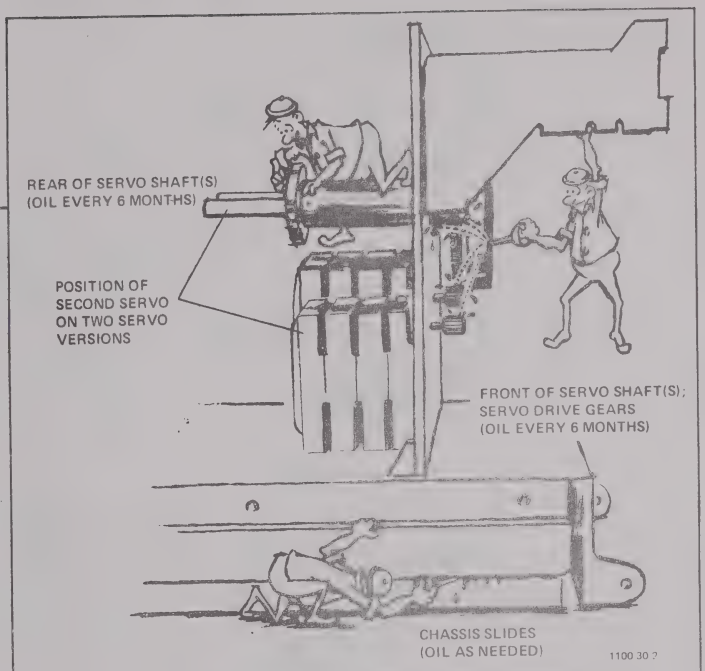
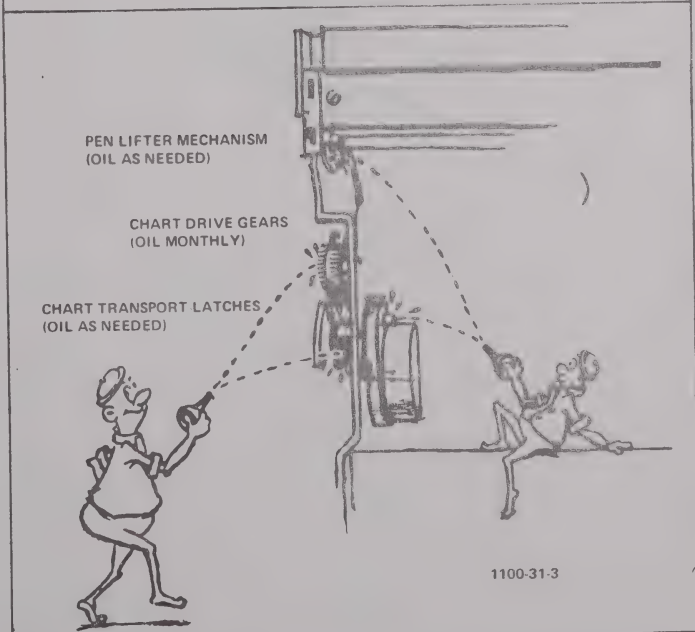

REAR OF SERVO SHAFT(S) (OIL EVERY 6 MONTHS)
POSITION OF SECOND SERVO ON TWO SERVO VERSIONS
FRONT OF SERVO SHAFT(S); SERVO DRIVE GEARS (OIL EVERY 6 MONTHS)
CHASSIS SLIDES (OIL AS NEEDED)

1100 30 2



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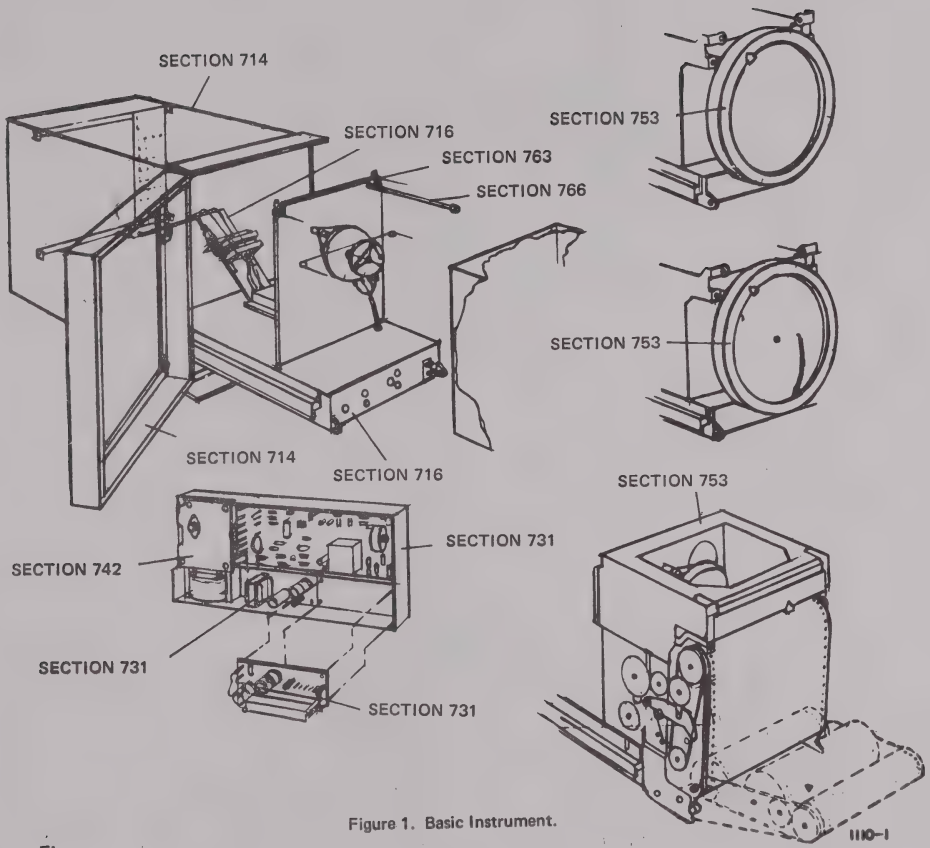

Figure 1. Basic Instrument.

Figure and Key No.	Description
1	Major instrument components parts lists will be found by referring to sections bearing the first 3 digits of a section number.
	714- enclosures, door and case
	716- chassis
	731- servo package
	731- measuring circuit unit
	731- circuit voltage unit
	742- amplifier
	749- servo motor
	753- display package
	763- set point and cables
	766- front set contact control

7

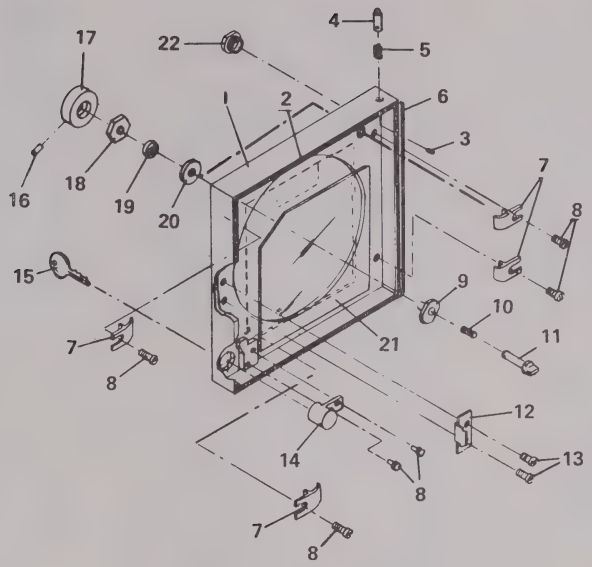

Figure 1. Door Assembly

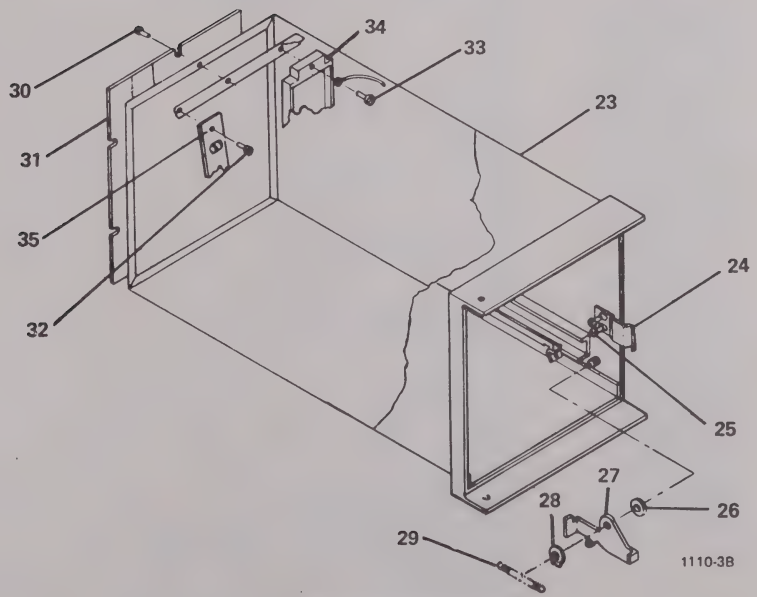

Figure 2. Case Assembly

ELECTRONIK 111
ENCLOSURE & DOOR, SMALL
PARTS LIST

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 1 10	Quantity
1				
	30676777-TAB	door assembly (see table 1)		1
2	30676788-001	gasket		1
3	30723691-001	pin		1
4	30368707-001	hinge pin, top (circular chart)		1
	30368707-002	hinge pin, top (strip chart)		1
5	30079034-000	spring		1
6	30677166-001	gasket		1
7	30676787-001	clip		4
8	*	screw #6 self tapping slotted hex head 3/8		4 or 6
9	30676797-001	bushing		1
	30679247-001	bushing (motor driven set point)		1
10	30676799-001	spring		1
	30000804-000	spring (motor driven set point)		1
11	30676796-001	shaft		1
	30679282-001	shaft (motor driven set point)		1
12	30676791-001	latch		1
13	*	screw #6 self tapping slotted hex head 1/4		2
14	30676792-001	lock assembly with two keys (option)		1
15	30040039-000	key		1
16	30040958-003*	set screw		1
17	30676798-001	knob		1
	30676798-002	knob (motor driven set point)		1
18	30356657-000*	hex nut		1
19	30352213-000*	lockwasher		1
20	30371348-001*	washer		1
	30071324-006	washer (motor driven set point)		1
21	30676786-001	glass		1
22	30677147-002	lens (multipoint only)		1
23	30676760-001	case		1
24	30676829-001	door catch		1
25	30000005-404*	screw 4-40 bdg. hd. 1/4"		2
26	30368014-002	flat washer		2
27	30676902-001	chassis latch		2
28	30371524-108	retaining ring		2
29	30676840-001	spring		2
30	30000009-804*	screw 8-32 wsh. hd. 1/4"		6
31	30676766-001	rear cover		1
32	30000005-803*	screw 8-32 bdg. hd. 3/16"		1
33	30000005-810*	screw 8-32 bdg. hd. 5/8"		1
34		drawbridge, chassis (refer to section 715-51 detail parts)		1
35		drawbridge, pneumatic (refer to section 715-51 for detail parts)		1

*Commercially available parts.

TABLE 1

PART NO.	DESCRIPTION
30676777-009	door assembly-strip chart w/o lock
30676777-010	door assembly-strip chart w/set point w/o lock
30676777-011	door assembly-strip chart w/lock
30676777-012	door assembly-strip chart w/set point and lock
30676777-013	door assembly-circular chart w/o lock
30676777-014	door assembly-circular chart w/set point w/o lock
30676777-015	door assembly-circular chart w/lock
30676777-016	door assembly-circular chart w/set point and lock
30676777-021	door assembly-multipoint w/o lock
30676777-022	door assembly-multipoint w/set point w/o lock
30676777-023	door assembly-multipoint w/lock
30676777-024	door assembly-multipoint w/set point and lock

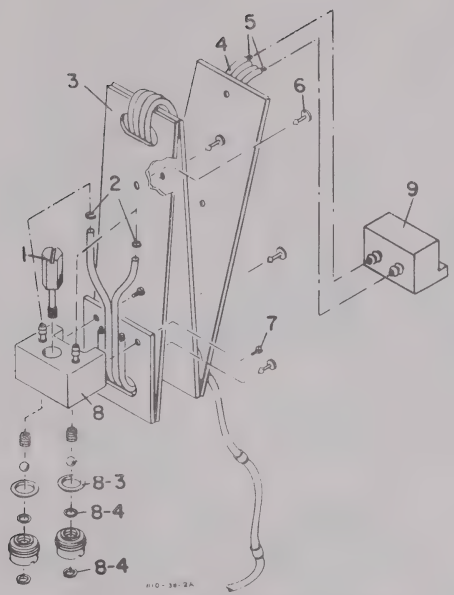

Figure 1. Drawbridge, Pneumatic Transmitter

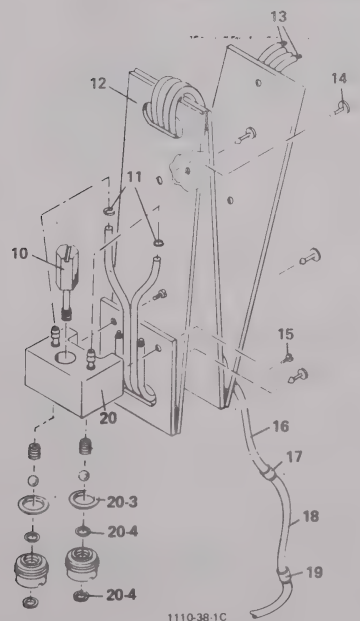

Figure 2. Drawbridge, Pneumatic Controller

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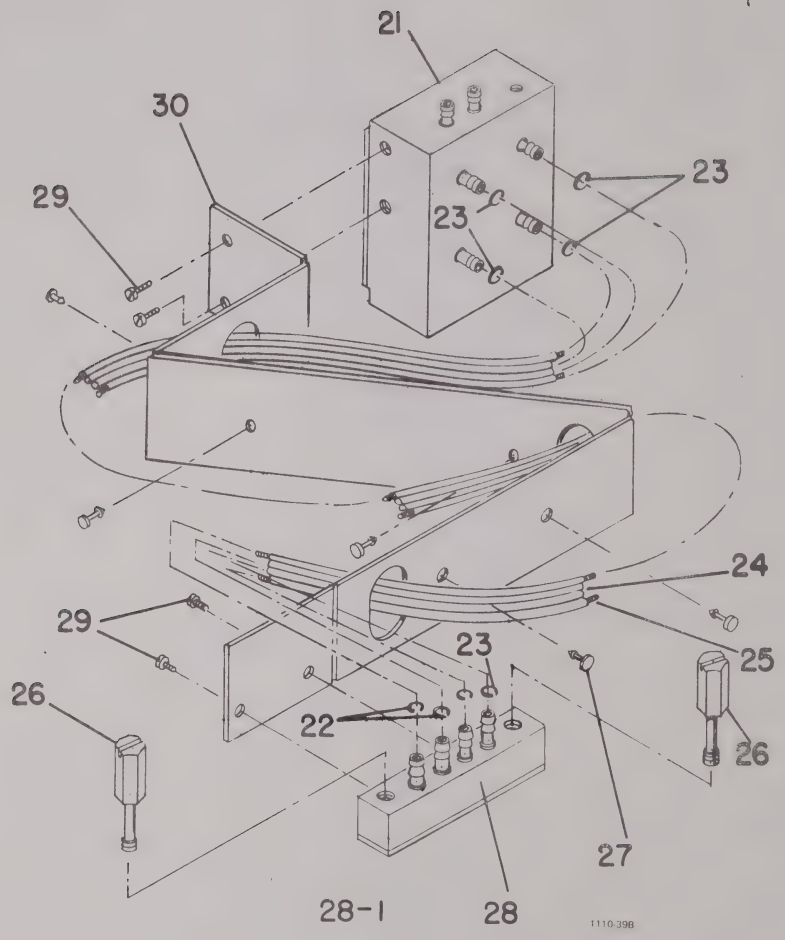

Figure 3. Drawbridge, Pneumatic Controller, Internally Mounted

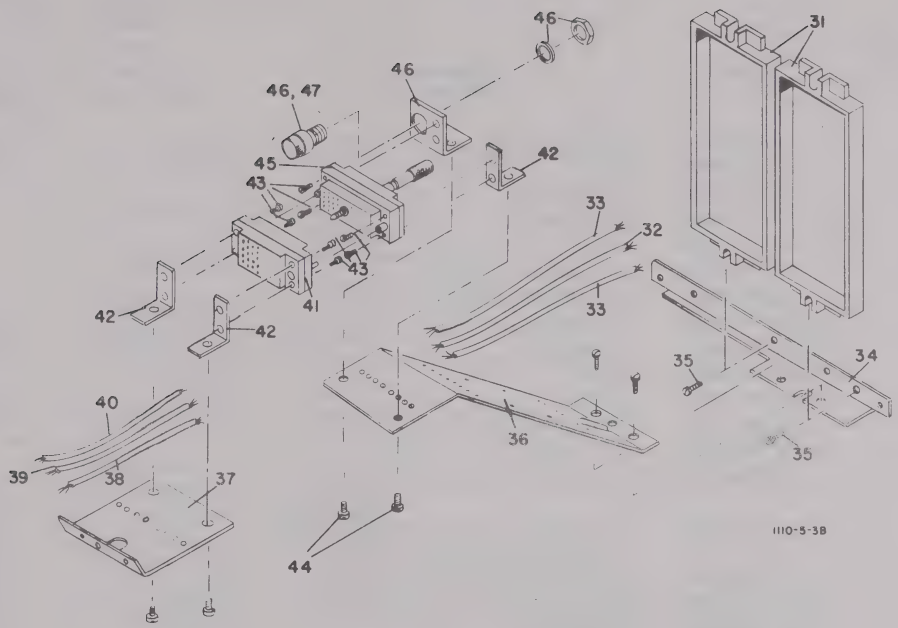

Figure 4. Instrument Drawbridge and Terminal Panel

IMPORTANT

1. An asterisked part number indicates that the described part is commercially available. For your convenience, all commercially available hardware and electrical components have been put in parts kits which can be ordered by part number 30734897-001 (electrical components - 1 each) and 30734892-001 (hardware - 10 each).
2. "(K)" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately.

Figure No. 1 Key No.	Part No.	Description	Recom'd Spare Parts Per 10	Recom'd Spare Parts Per 100	Quantity Unit	Quantity Kit
	30689980-001	drawbridge, pneumatic transmittwr			1	
1	(K) 30735146-001	screw			1	1
2	(K) 30735146-001	retaining ring			4	4
3	(K) 30735146-001	drawbridge			1	1
4	(K) 30735146-001	tubing, ribbon			1	1
5	(K) 30735146-001	spring			2	1
6	(K) 30735146-001	clip button			5	2
7	30000006-505*	screw 6-32 bdg. hd. 5/16"			2	
8	30689976-001	quick disconnect			1	
8-3	30354697-512	"O" ring	1	2	2	
8-4	30354697-514	"O" ring	1	2	4	
9	30677335-001	block, customer connection			1	

Figure No. 2 & 3 Key No.	Part No.	Description	Recom'd Spare Parts Per 10	Recom'd Spare Parts Per 100	Quantity Unit	Quantity Kit
	30689980-002	drawbridge, pneumatic controller			1	
10	(K) 30735146-002	screw			1	1
11	(K) 30735146-002	retaining ring			2	4
12	(K) 30735146-002	drawbridge			1	1
13	(K) 30735146-002	spring			2	1
14	(K) 30735146-002	clip button			4	2
15	30000005-605*	screw 6-32 bdg. hd. 5/16"			2	
16	(K) 30735146-002	tubing ribbon			1	1
17	(K) 30735146-002	connector			4	2
18	(K) 30735146-002	tubing			2	1
19	(K) 30735146-002	tubing			2	2
20	30689976-001	quick disconnect			1	
20-3	30354697-512	"O" ring	1	2	2	
20-4	30354697-514	"O" ring	1	2	4	
	30677303-001	drawbridge, pneumatic controller internally mounted			1	
21	30677285-001	block assembly, cust. conn.			1	
22	(K) 30735146-003	retaining ring			4	4
23	(K) 30735146-003	retaining ring			4	4
24	(K) 30735146-003	tubing ribbon			1	1
25	(K) 30735146-003	spring			2	1
26	(K) 30735146-003	screw 8-32, connecting block			2	1
27	(K) 30735146-003	clip retaining			5	2
28	30677299-001	block connection assembly			1	
28-1	(K) 30735146-003	gasket			1	2
29	30000005-604*	screw 6-32 bdg. hd. 1/4"			4	
30	(K) 30735146-003	drawbridge			1	1

Figure No. 4 Key No.	Part No.	Description	Recom'd Spare Parts Per 10	Recom'd Spare Parts Per 100	Quantity Unit	Quantity Kit
	30677357-001	terminal panel and drawbridge, one pen class 111/112			1	
	30677357-002	terminal panel and drawbridge, two pen class 111			1	
	30677357-004	terminal panel and drawbridge, two pen class 112			1	
31	30676838-001	terminal panel (two pen 111 - qty. 2)			1	1
32	(K) 30735147-001	cable assembly, 3 wire (power)			1	1
33	30677343-001	cable assembly, 5 wire (input) (two pen 111 - qty. 2)			1	
34	(K) 30735147-001	mounting bracket (one pen 111/112 and two pen 111)			1	1
	(K) 30735147-001	mounting bracket (two pen 112)			1	1
35	30000018-810*	screw 8-32 phillips hd. 5/8"			2	
36	(K) 30735147-001	drawbridge			1	1
37	(K) 30735147-001	drawbridge			1	1
38	30682602-001	cable assembly, 8 wire (input and s/w)			1	
39	(K) 30735147-001	cable assembly, 4 wire (power)			1	1
40	30682602-002	cable assembly, 8 wire (input and s/w) two pen			1	
41	30370866-001	connector, male			1	
42	(K) 30735147-001	bracket			3	1
43	30000008-404*	screw 4-40 fil. hd. 1/4"			8	
44	30000005-403*	screw 4-40 bd. hd. 3/16"			4	
45	30370865-001	connector female			1	
46	30677355-001	fuse holder assembly			1	
47	30079397-002	fuse slow blow 1.0 amps	1	2	1	

Summary of Kit Contents
Kit No. 30735146-001

Figure No.	Key No.	Description	Qty.
1	1	screw	1
	2	retaining ring	4
	3	drawbridge	1
	4	ribbon tubing	1
	5	spring	1
	6	clip button	2
		Kit No. 30735146-002	
2	10	screw	1
	11	retaining ring	4
	12	drawbridge	1
	13	spring	1
	14	clip button	2
	16	tubing ribbon	1
	17	connector	2
	18	tubing	1
	19	tubing	2
		Kit No. 30735146-003	
3	22	retaining ring	4
	23	retaining ring	4
	24	tubing ribbon	1
	25	spring	1
	26	screw	2
	27	clip retaining	2
	28-1	gasket	2
	30	drawbridge	1
		Kit No. 30735147-001	
4	31	terminal panel	1
	32	cable assy. - 3 wire	1
	34	mounting bracket	1
	34	mounting bracket	1
	36	drawbridge	1
	37	drawbridge	1
	39	cable assembly, 4 wire	1
	42	bracket	1

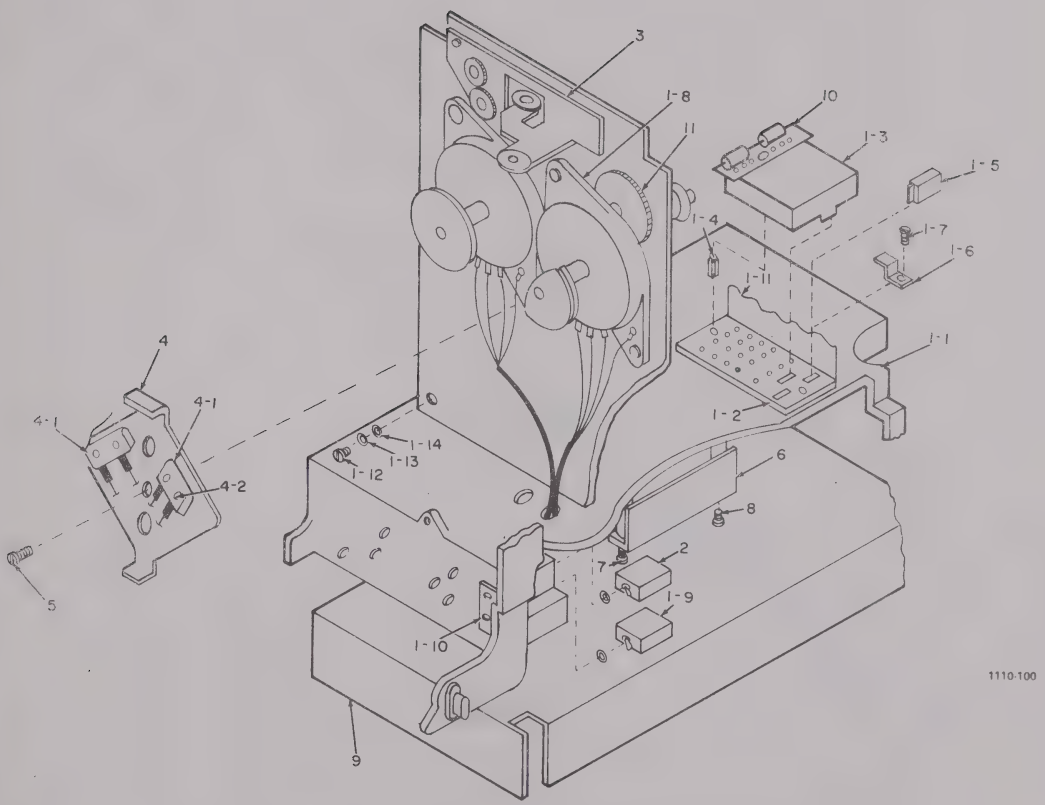

Figure 1, Chassis Assembly

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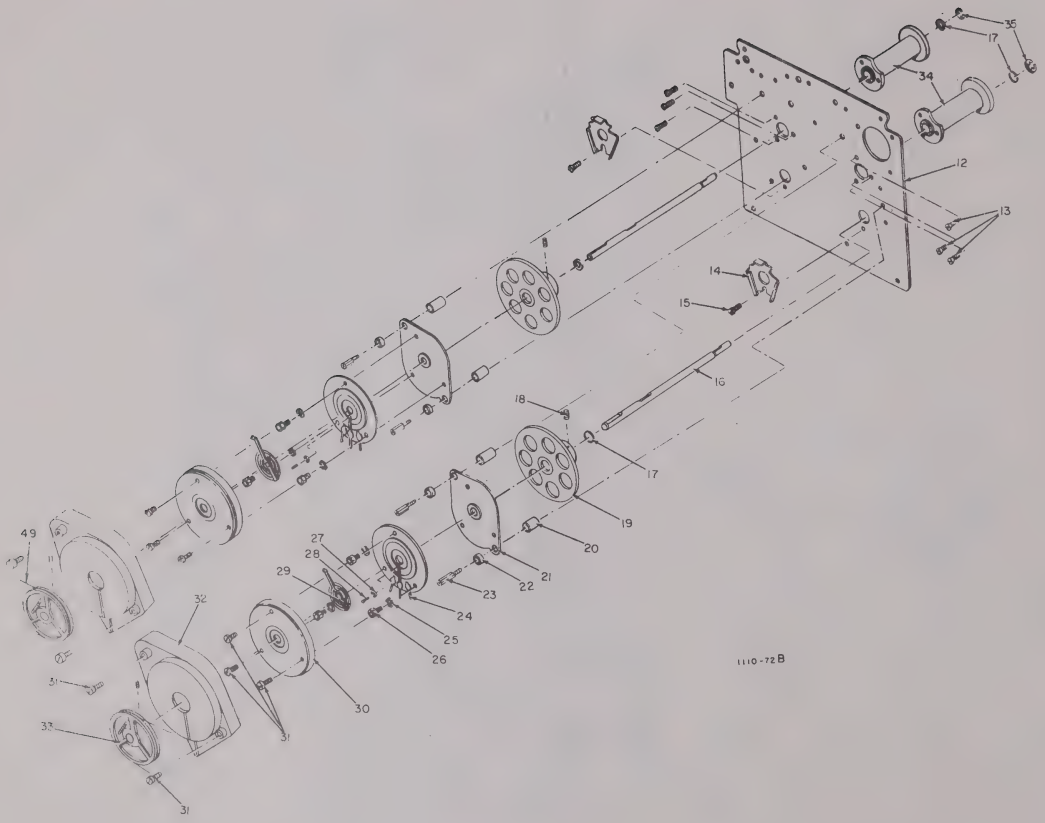
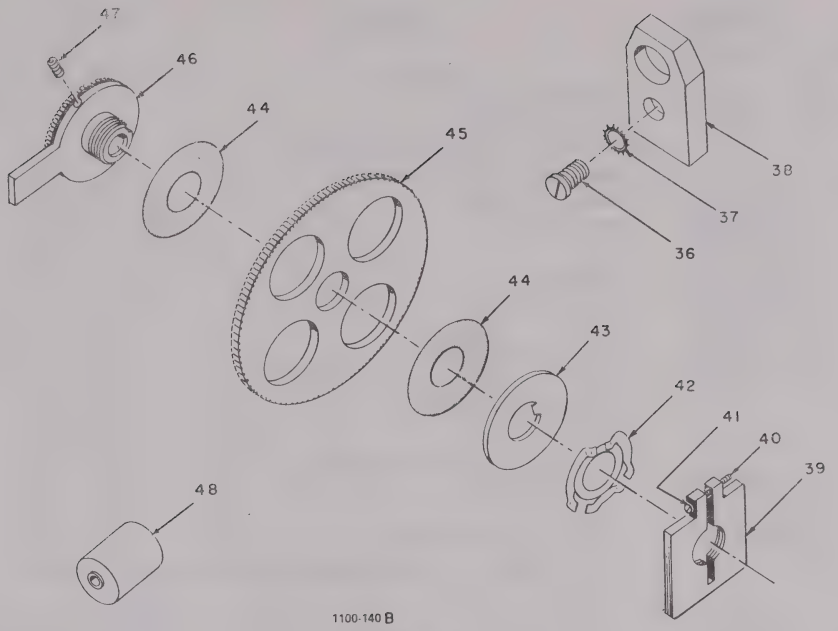


Figure 2, Servo Drive Assembly



Figrue 3, Bull Gear & Clutch Assembly, used on Multipoint Recorders

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 10	Recom'd Spare Parts Per 100	Quantity
1	see table 1	chassis assembly			1
1-1	30676843-001	basic chassis, class 111			1
	30682263-001	basic chassis, class 112			1
1-2	30682599-002	terminal connector board			1
1-3	30682600-001	terminal cover			1
1-4	30682608-001	shoulder screw			1
1-5	30681318-002	plug housing			1
1-6	30682631-001	bracket			1
1-7	* 30000006-806	screw 8-32 rd hd 3/8"			1
1-8	see table 1	servo drive assembly (see figure 2 for detail parts)			
1-9	30676832-001	power switch			1
	30079295-000	lockwasher			1
1-10	30676833-001	nameplate			1
1-11	30677357-item	terminal panel and drawbridge assembly (see section 715-51)			1
1-12	* 30000005-810	screw 8-32 bd hd 5/8"			2
1-13	* 30009771-000	lockwasher			
1-14	30364998-000	washer			2

* commercially available parts, buy locally

Section 716-76

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 10	Recom'd Spare Parts Per 100	Quantity
1					
2	–	chart drive switches (see section 753-XX)			1
3		gear mtg. plate assembly (motor driven set point) see section 763-31			1
4	30682483-003	bracket and switch			1
4-1	30676926-001	micro switch			2
4-2	30000008-206	screw			4
	30364604-000	lockwasher			4
5	* 30000012-804	screw 8-32 flat hd 1/4"			1
6	30676831-001	cover			1
7	* 30000005-606	screw 6-32 bd hd 3/8"			1
8	* 30000005-603	screw 6-32 bd hd 3/16"			1
9	–	recorder servo assemblies (see section 731-8)			1
10		PWB for desensitizing switch, used on:			1
	30682394-001	1 servo recorder			
	30682394-002	2 servo recorder			
	30682394-003	1 mV, 1 second pen speeds			
11		error generator, motor driven setpoint, see section 763-31			

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 10	Recom'd Spare Parts Per 10	Quantity 1st Servo	Quantity 2nd Servo
2						
12	30676858-001	servo mtg. plate, class 111			1	1
	30682264-001	servo mtg. plate, class 112			1	1
13	* 30000007-806	screw 8-32 fil hd 3/8"			3	6
14	30676852-001	stop			1	2
15	* 30000012-804	screw 8-32 bd hd 1/4"			1	2
16	30679098-001	servo drive shaft, see table 1			1	–
	30679098-002	servo drive shaft, see table 1			–	1
17	30370265-001	thrust washer			2	4
18	30682405-806	set screw			2	4
19	30676850-001	bull gear (not used w/clutch) see Fig. 3			1	2
20	30676828-001	spacer			2	4
21	30676931-001	mtg. plate			1	2
22	30676807-001	collar			2	4
23	30677508-001	stud			2	4
24	30683380-001	conductive plastic element	2	4	1	2
	30683380-002	conductive plastic element (reverse range)	2	4	1	2
25	30360900-001	lockwasher			3	6
26	30676810-001	stud			3	6
27	30005900-000	washer			1	2
28	30000005-202	screw 2-56 binding head			1	2
29	30677501-501	slidewire contact arm	2	4	1	2
30	30676930-001	dust cover assembly			1	2
31	30000005-403	screw 4-40 bd hd 3/16"			3	5

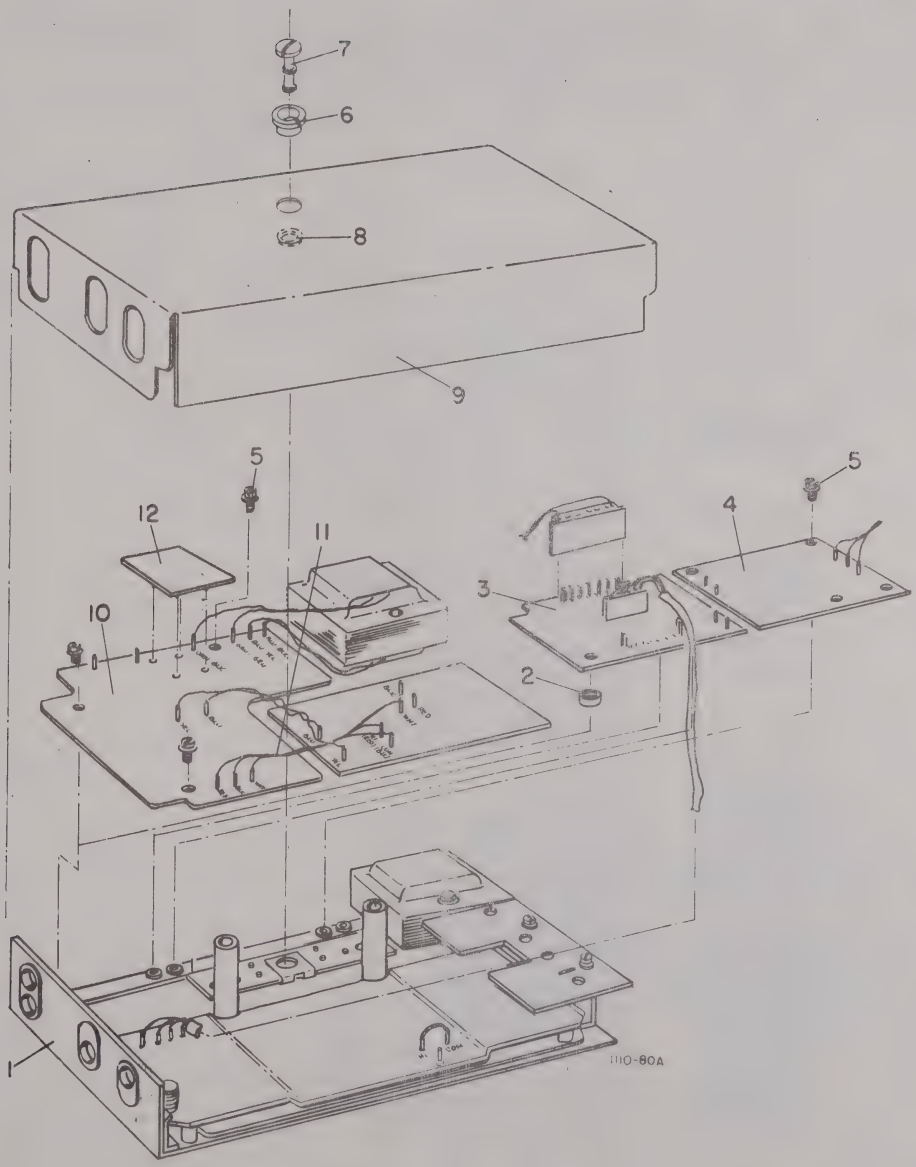
* commercially available parts, buy locally

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 10	Recom'd Spare Parts Per 100	Quantity 1st Servo	Quantity 2nd Servo
32	30677505-001	insulating cover			1	2
33	30676846-001	cable drum, class 111			1	1
	30682266-001	cable drum, class 112			1	1
34	30676855-001	bearing housing			1	2
35	30371339-210	retaining ring			1	2
3 36	* 30000005-808	screw 8-32 bd hd 1/2"			1	1
37	* 30009771-000	lockwasher #8 serrated			1	1
38	30683794-001	bull gear stop			1	1
39	30683790-001	locknut			1	1
40	* 30000006-212	screw 2-56 rd hd 3/4"			1	1
41	* 30006581-000	lockwasher #2			1	1
42	30370283-001	spring washer			1	1
43	30370282-001	key washer			1	1
44	30683789-001	friction washer (clutch)			2	2
45	30676842-002	bull gear			1	1
46	30683793-001	hub and stop			1	1
47	30682405-806	set screw			1	1
48	30676828-003	spacer			2	2
49		Servo Drive Cable (see below)	1	4		
	30676862-001	class 111 strip chart #1 pen			1	—
	30676862-002	class 111 strip chart #2 pen			—	1
	30676862-001	class 111 strip chart multipoint			1	—
	30676862-004	class 111 circular chart #1 pen			1	—
	30676862-005	class 111 circular chart #2 pen			—	1
	30676862-007	class 112 #1 pen			1	—
	30676862-008	class 112 #2 pen			—	1
	30676862-008	class 112 multipoint			1	—

* commercially available parts, buy locally

TABLE 1

Description	Key No. 1 Chassis Ass'y	Key No. 1-8 Servo Drive Ass'y	Key No. 16 Servo Drive Shaft
Class 111 One Pen and Multipoint	30676914-001	30676844-001	30679098-001
Class 111 Two Pen or One Pen with Motor Driven Set Point	30676914-002	30676844-002	30679098-001 30679098-001
Class 111 One Pen with Pulse or Syncr. Motor Driven Set Point	30676914-003	30676844-006	30679098-001 30679098-001
Class 112 One Pen or Multipoint	30682431-001	30676844-003	30679098-002
Class 112 Two Pen or One Pen with Motor Driven Set Point	30682431-002	30676844-005	30679098-001 30679098-002
Class 112 One Pen with Pulse or Syncr. Motor Driven Set Point	30682431-004	30676844-008	30679098-001 30679098-002



Servo Package

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IMPORTANT

1. An asterisked part number indicates that the described part is commercially available. For your convenience, all commercially available hardware and electrical components have been put in parts kits which can be ordered by part number 30734897-001 (electrical components - 1 each) and 30734892-001 (hardware - 10 each).
2. "(K)" denotes that the part number is for the parts kit in which the described part is included. The described part cannot be ordered separately.

Figure No. 1 Key No.	Part No.	Description	Recom'd Spare Parts Per 10	Recom'd Spare Parts Per 100	Quantity Unit	Quantity Kit
1	30679257-501	amplifier assembly, single end (see Section 742-)			1	
	30679256-501	amplifier assembly, push-pull (see Section 742-)			1	
2	(K) 30734891-001	spacer			1	4
3	30370790-999	measuring circuit unit for T.C. M.V., D.C., Volt tachometer, D.C. current & radiamatic actuations			1	
	30370791-999	measuring circuit unit for resistance thermometer			1	
3-1	30682793-001	zero adjustment pot (not shown)			1	
3-2	30682793-002	span adjustment pot (not shown)			1	
3-3	(K) 30734891-001	pot mtg. bkt. (not shown)			1	2
3-4	(K) 30734891-001	nylon screw for mtg. bkt.			1	4
4	30372970-501	constant voltage unit, resistance thermometer actuation			1	
	30372971-501	constant voltage unit, all other actuations except conductivity			1	
5	(K) 30734891-001	screw			as req'd	6
6	(K) 30734891-001	bearing, snap in			1	4
7	(K) 30734891-001	stud, 1/4 turn fastener			1	2
8	(K) 30734891-001	retainer			1	4
9	30679183-001	cover			1	
10	30679878-TAB	measuring circuit unit for (conductivity actuation) (see Section 733-)			1	
11	30370827-001	cable assembly, conductivity			1	
12	30679233-501	range card assy. (0-10)	1	2	1	
	30679233-502	range card assy. (0-30)	1	2	1	
	30679233-503	range card assy. (0-50)	1	2	1	
	30679233-504	range card assy. (0-100, 1000, 10,000)	1	2	1	
	30679233-505	range card, assy. (0-300, 3000, 30,000)	1	2	1	
	30679233-506	range card assy. (0-500, 5000, 50,000)	1	2	1	
	30679233-507	range card assy. (0-100,000)	1	2	1	

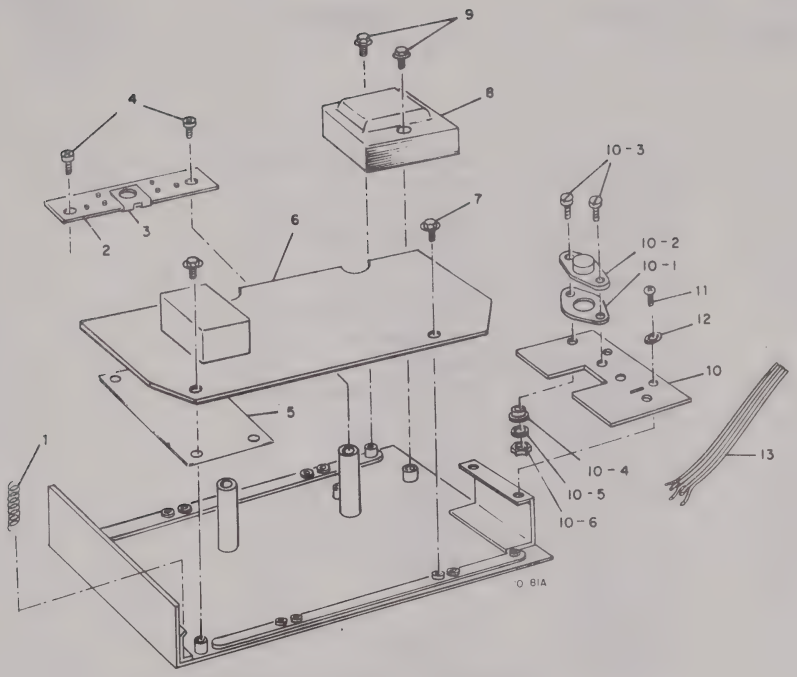

Figure 1. Amplifier Assembly (Single End)

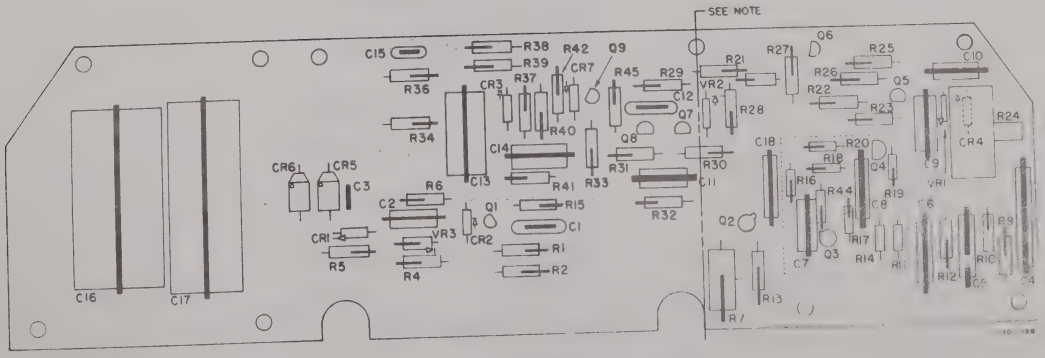

Figure 2. Amplifier Board Assembly.

742-0032-110

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 1	Recom'd Spare Parts Per 10	Quantity
1					
	30679257-501	amplifier assembly, single end	1	2	1
1	30368481-001	spring			1
2	30682374-001	plate			1
3	30679206-001	receptacke, clip on			1
4	30679214-001	screw			2
5	30677265-001	insulator			1
6	30676602-501	amplifier board assembly (see figure 2)			1
7	30679213-001	screw			4
8	30676607-001	power transformer assembly			1
9	30730175-616	screw			2
10	30679203-001	heat sink assembly			1
10–1	30373315-001	insulator			1
10–2	30723423-020	transistor RCA37835			1
10–3	*	screw 6–32 bdg. hd. 3/8			2
10–4	30373316-001	insulating washer			2
10–5	30073644-000	lockwasher			2
10–6	30722766-001	nut			2
11	30674113-604	screw			2
12	30006583-000	lockwasher			2
13	30676610-001	cable assembly			1
2	30676602-501	board assembly, amplifier	1	2	1
C1,C3	*	capacitor .1 μf, ± 20%, 200 WVDC metalized plastic			2
C2	*	capacitor 68 μf, ± 10%, 35 WVDC electrolytic tantalum			1
C14	*	capacitor 1 μf ± 20%, 20 WVDC electrolytic tantalum			1
C11	*	capacitor 10 μf, ± 20%, 10 WVDC electrolytic tantalum			1
C12	*	capacitor .01 μf, ± 20%, 500 WVDC ceramic dielectric			1
C13	*	capacitor 100 μf, ± 100-10%, 25 WVDC electrolytic, alum oxide			1
C15	*	capacitor .001 μf, 25 WVDC ceramic dielectric			1
C16	*	capacitor 1 μf, ± 20%, 330 AC WVDC metalized paper			1
C17	*	capacitor 130 μf, ± 50-10%, 15 AC WVDC electrolytic, alum oxide NP			1
CR1,CR2, CR3,CR7	*	diode 1N459			4
CR5,CR6	*	diode 1N2069			2

* commercially available parts

NOTE: All components to the right of the dotted line replaceable, varnished in place

742-0032-110

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 1 10	Quantity
Q1,Q9	*	transistor 2N3702		2
Q7,Q8		transistor 2N3391		2
R1	*	resistor 1/2W, 27K +10% composition		1
R2	*	resistor 1/2W, 5.6K, +10% composition		1
R4	*	resistor 1/2W, 22K, +5% composition		1
R5	*	resistor 1/2W, 2.2K, +10 composition		1
R6,R41	*	resistor 1/2W, 56 ohms, +10% composition		2
R37,R45	*	resistor 1/2W, 10K, +10% composition		2
R15	*	resistor 1/2W, 1 MEG, +10% composition		1
R42	*	resistor 1/2W, 820K, +10% composition		1
R31	*	resistor 1/2W 220K, +10% composition		1
R29,R36	*	resistor 1/2W, 100K, +10% composition		2
R32	*	resistor 1/2W, 1K +10% composition		1
R33	*	resistor 1/2W, 68K +10% composition		1
R34	*	resistor 1/2W, 560K, +10% composition		1
R38	*	resistor 1/2W, 560 ohms, +10% composition		1
R39	*	resistor 1/2W, 1.5K, +10% composition		1
R40	*	resistor 1/2W 18K, +10% composition		1
VR3	30369764-021	diode		1

* commercially available parts

NOTE: All components to the right of the dotted line not replaceable, varnished in place.

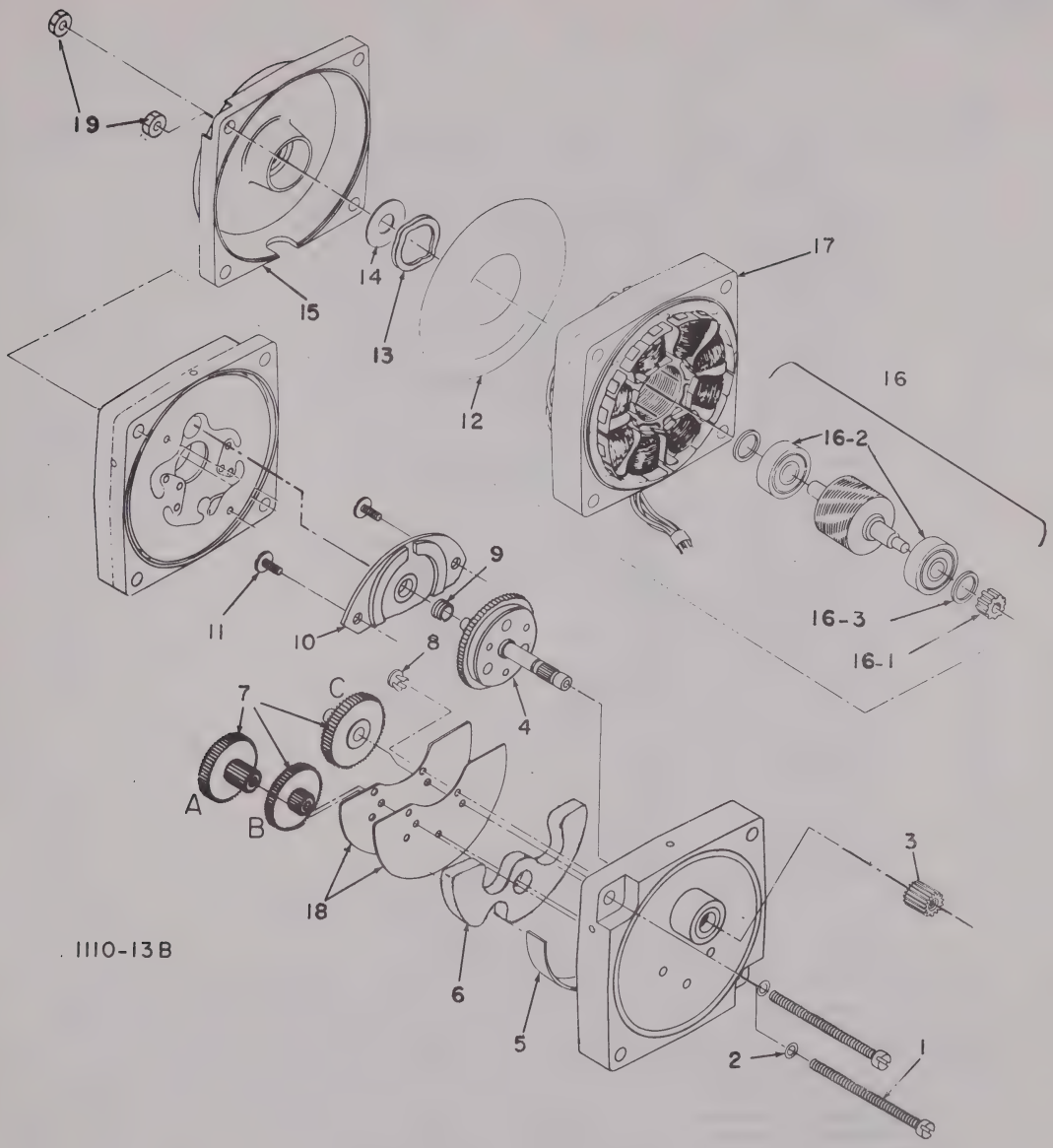

Figure 1. Servo Balancing Motor Assembly

Motor 30676665-	501	502	503	504	505	506	507	508
Gear Ratio	10:1	30:1	1.92:1	5.83:1	4.4:1	10:1	30:1	5.83:1
RPM	144	48	750	250	300	144	48	250
Torque oz/in	25	60	8	21	17	25	60	21

Figure and Key No.	Part No.	Description	Quantity
—	see table 2	Servo Balancing Motor	1
1	30000080-032	screw 10-32 fil hd 2"	2
2	30000925-000	lockwasher	2
3	30676747-001	output pinion	1
4	30362430-506	output shaft & gear	1
	30362429-003	output shaft (used on item 505 only)	
5	30369756-001	oil wick	1
	30369756-002	oil wick (used on item 503 only)	
6	30362486-000	oil wick	1
7	see table 3	change gears A, B, C	as req'd
8	30362489-000	fastener for wick retainer (used on item 501, 504, 506 & 508 only)	1
9	30362478-002	spacer	1
10	30362410-001	bearing plate	1
	30362410-002	bearing plate (used on item 505 only)	
11	30681680-605	screw 6-32 bd hd 5/16"	2
12	30362628-000	insulator	1
13	30689080-001	spring washer	1
14	30362455-002	shim washer	as req'd
15	30362415-000	rear housing	1
16	see table 1	armature ass'y	1
16-1	see table 1 & 3	armature output pinion	1
16-2	30685630-001	bearing	2
16-3	30689250-001	washer	2
17	see table 1	stator ass'y	1
18	see table 1	wick retainer	2
19	30005966-000	hex nut (10-32)	2

Table 1. Variable Detail Parts
115 Volt, 50 or 60 Hertz

Motor 30676665-5XX			501	502	503	504	505	506	507	508
Key	Part No.	Description								
16	30362416-501	armature	1			1		1		1
	30362416-504	armature					1			
	30362416-505	armature		1					1	
	30362416-507	armature			1					
16-1	30362442-000	armature pinion	1			1		1		1
	30362441-000	armature pinion		1					1	
	30676749-001	armature pinion			1					
	30362440-002	armature pinion					1			
17	30365457-531	stator assy.	1	1		1				
	30365457-532	stator assy.			1		1	1	1	1
18	30362487-001	wick retainer	2	2			omit	2	2	
	30676753-001	wick retainer			2	2				2

TABLE 2

Servo Balancing Motor		Used On/With	
1 or 2 Pen Recorder	Multipoint Printer	Range Span	Balance Speed @ 60 Hertz
not available	30676665-508	< 5 mv	35 sec.
not available	30676665-504	> 5 mv	35 sec.
30676665-507	30676665-508	< 5 mv	15 sec. *
30676665-502	30676665-504	> 5 mv	15 sec. *
30676665-506	30676665-508	< 5 mv	5 sec.
30676665-501	30676665-504	> 5 mv	5 sec.
30676665-505	30676665-503	≷ 5 mv	2 sec.
30676665-503	not available	≷ 5 mv	1 sec.
not available	30676665-508	< 5 mv	10 sec.
not available	30676665-504	> 5 mv	10 sec.
not available	30676665-508	< 5 mv	70 sec.
not available	30676665-504	> 5 mv	70 sec.

Class 111/112 Servo Motor Option
Motor Driven Set Point

30676665-501	5 sec.	DC Volts
30676665-502	15 sec.	DC Volts
30676665-501	5 sec.	DC Follower
30676665-502	15 sec.	DC Follower
30676665-501	5 sec.	DC Current
30676665-502	15 sec.	DC Current

** all but the mechanical multipoint, which balances @18 sec.*

Table 3. Change Gears & Armature Pinion

Gear Ratio	Gear "A" & No. of Teeth	Gear "B" & No. of Teeth	Gear "C" & No. of Teeth	Armature Pinion
10:1	omit	omit	30369844-001 35T & 14T	30362442-000 15T
30:1	30369847-001 42T & 12T	30364784-000 44T & 28T	30364838-001 28T	30362441-000 11T
1.92:1	omit	30676751-001 54T & 38T	omit	30676749-001 22T
5.83:1	omit	omit	30676750-001 35T & 24T	30362442-000 15T
4.4:1	omit	omit	omit	30362440-002 10T

7

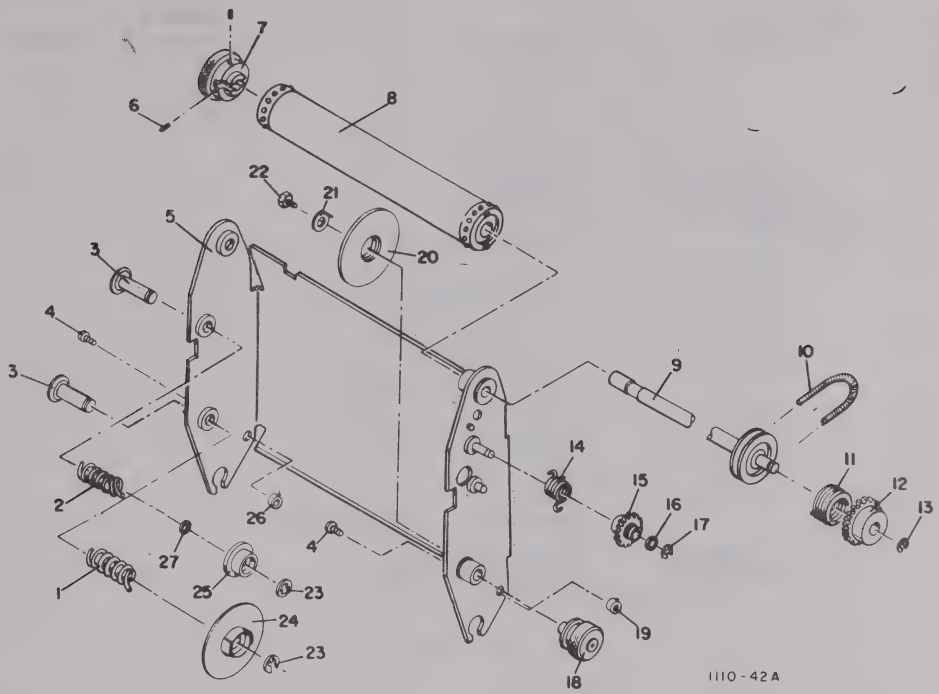

Chart Transport Assembly (Multipoint, 1 & 2 Pen)

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 10 100	Quantity
	30679262-001	chart transport assembly (multipoint)		1
	30679262-002	chart transport assembly (1 & 2 pen)		1
1	30687670-001	thrust spring, L.H.		1
2	30687670-002	thrust spring, R.H.		1
3	30679188-001	pin		2
4	*	screw 10–32 rd. hd. 1/4		2
5	30679261-001	chart platen assembly		1
6	*	set screw bristo socket 5–40 cup point 1/4		2
7	30676571-001	knob		1
8	30723299-002	drum assembly, rubber (multipoint)		1
	30723299-003	drum assembly, aluminum (1 & 2 pen)		1
9	30676588-001	shaft assembly		1
10	30723382-001	garter spring		1
11	30677412-001	clutch spring		1
12	30679005-001	clutch gear		1

7

*commercially available parts

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 10 100	Quantity
13	30371539-104	retaining ring		1
14	30676590-001	brake spring		1
15	30679002-001	gear		1
16	*	washer .128 ID x .219 OD .031 THK		1
17	30079208-000	cotter		1
18	30676576-001	reroll knob assembly		1
19	30679187-001	stop		1
20	30687531-003	disc, left reroll		1
21	30676580-001	driving washer		1
22	*	screw 8—32 hex. hd. 5/16		1
23	30371539-108	retaining ring		2
24	30687531-002	disc, right reroll		1
25	30680294-001	holder		1
26	30679187-002	stop		1
27	*	washer .281 ID x .438 OD . 062 THK		1
	30365615-001	fiber reroll tube		
	30667927-002	chart drive reroll tube		

*commercially available parts

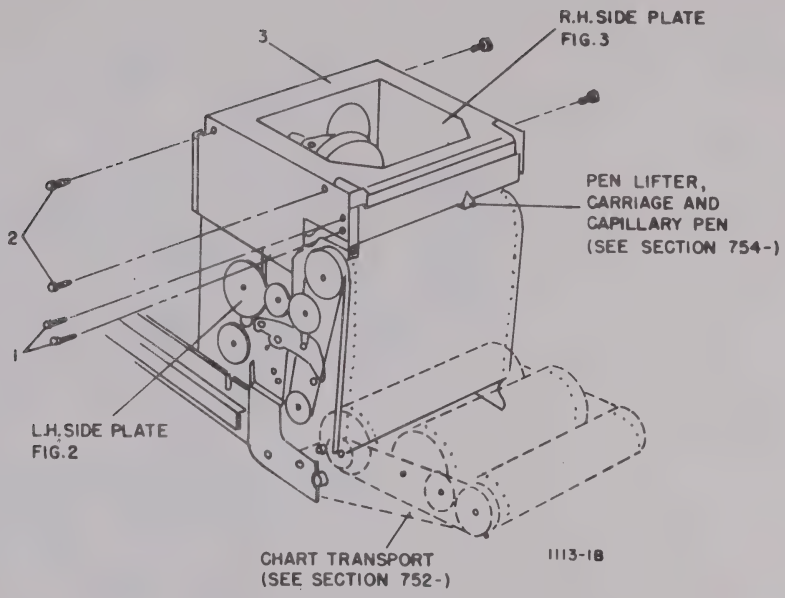

Figure 1 - Display Package.

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 1 10	Quantity
1		chart transport assembly (see Section 752-)		
	30676773-TAB	left hand side plate assembly (see Figure 2)		1
	30676774-TAB	right hand side plate assembly (see Figure 3)		1
		pen lifter, carriage & capillary pen (see Section 754-)		1
1	*	screw 6-32 flat hd. 3/16		2
2	*	screw 6-32 flat hd. 1/4		4
3	30676891-001	chassis cover (111)		1
4	30682269-001	chassis cover (112)		1

* commercially available parts

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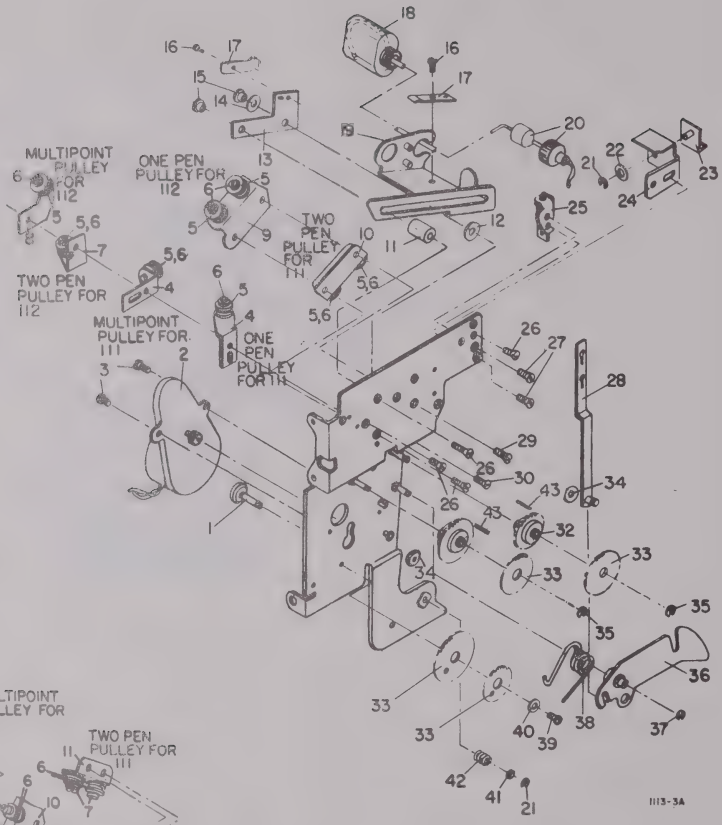
MULTIPOINT PULLEY FOR 112
ONE PEN PULLEY FOR 112
TWO PEN PULLEY FOR 111
TWO PEN PULLEY FOR 112
MULTIPOINT PULLEY FOR 111
ONE PEN PULLEY FOR 111
1113-3A

Figure 2 - Left Hand Side Plate Assembly

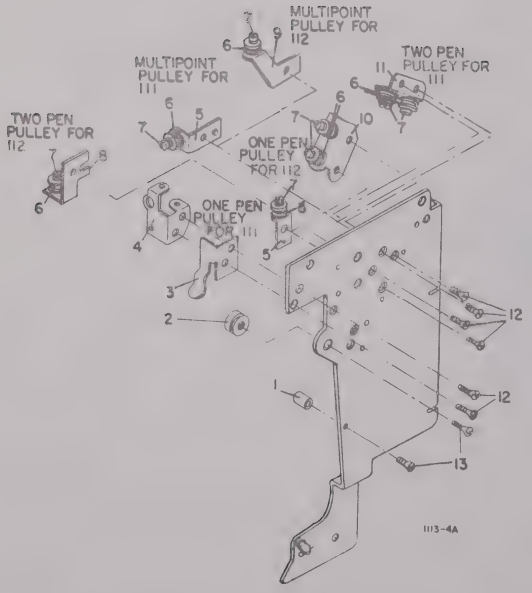
MULTIPOINT PULLEY FOR 112
MULTIPOINT PULLEY FOR 111
TWO PEN PULLEY FOR 111
TWO PEN PULLEY FOR 112
ONE PEN PULLEY FOR 112
ONE PEN PULLEY FOR 111
1113-4A

Figure 3 - Right Hand Side Plate Assembly

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 1	Recom'd Spare Parts Per 10	Quantity 30676773- 001	003	004	005
2	see Figure 2	left hand side plate assembly						
	30676773-001	one & two pen 111			1	–	–	–
	30676773-003	multipoint 111			–	1	–	–
	30676773-004	one & two pen 112			–	–	1	–
	30676773-005	multipoint 112			–	–	–	1
1	30676896-001	pin			1	1	1	1
2	see Figure 4	chart drive motor **	1	2	1	1	1	1
3	*	screw 6-32 bdg. hd. 3/16 **			2	2	2	2
4	30676707-002	bracket assembly with pulley			1	2	–	–
5	30367243-001	pulley, ball bearing				as req'd		
6	*	screw 3-48 X 3/16				as req'd		
7	30682368-002	bracket assembly with pulley **			–	–	1	–
8	30682299-001	bracket assembly with pulley			–	–	–	1
9	30682268-001	bracket assembly with pulley			–	–	1	–
10	30676703-002	bracket assembly with pulley **			–	1	–	–
11	30677141-001	spacer			1	–	1	–
12	*	washer .1406 I.D. X .50 O.D. X .010 thk			1	–	1	–
13	30677144-001	plate, mounting slide			1	–	1	–
14	30373427-001	spring washer			1	–	1	–
15	30677140-001	bushing			2	–	2	–
16	*	screw 4-40 bdg. hd. 3/16 **			2	–	2	–
17	30677143-001	clamp **			2	–	2	–
18	30676904-001	ink bottle **			1 or 2	–	1 or 2	–
19	30677137-001	bracket subassembly, ink			1	–	1	–
20	30677433-001	capillary assembly **	1	2	1 or 2	–	–	–
	30677433-002	capillary assembly **	1	2	–	–	1 or 2	–
21	30371539-104	retaining ring			1	2	1	2
22	30369095-002	spring washer			–	1	–	1
23	30679360-001	mounting plate assembly			–	1	–	1
24	30679354-001	bracket			–	1	–	1
25	30676723-001	latch bracket **			1	–	1	–
26	*	screw 6-32 phillips hd. 3/16				as req'd		
27	*	screw 6-32 phillips hd. 3/16**			2	–	2	–
28	30676677-001	lever			1	–	1	–
29	*	screw 6-32 phillips hd. 7/8			1	–	1	–
30	*	screw 6-32 phillips hd. 5/16			1	–	1	–
31	30679004-001	gear assy., change gear hub, 60T, 48DP			1	1	1	1
32	30679003-001	gear assy., change gear hub, 28T, 32 DP			1	1	–	–
	30674205-001	gear, 32T, 32DP			–	–	1	1
33	30676716-TAB	change gears (see table 2)				as req'd		
34	30683119-001	spring washer			2	2	2	2
35	30007403-000	external cotter			2	2	2	2

* commercially available parts

** not part of 30676773-TAB assembly

7

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 1	Recom'd Spare Parts Per 10	Quantity 30676773- 001	003	004	005
2								
36	30676700-001	latch assembly			1	1	1	1
37	30079208-000	external cotter			1	1	1	1
38	30676718-001	spring - torsion			1	1	1	1
39	*	screw 10-32 phillips hd. 1/4			1	1	1	1
40	*	washer .1952 ID X .4308 OD X .036 THK			1	1	1	1
41	*	washer .1285 ID X 234 OD X .010 THK			1	1	1	1
42	30676897-001	spring			1	1	1	1
43	30683120-001	pin			2	2	2	2

* commercially available parts

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 1	Recom'd Spare Parts Per 10	Quantity 30676774- 001	003	004	005
3								
	see Figure 3	right hand side plate assembly						
	30676774-001	one & two pen 111			1	–	–	–
	30676774-003	multipoint 111			–	1	–	–
	30676774-004	one & two pen 112			–	–	1	–
	30676774-005	multipoint 112			–	–	–	1
1	30674209-001	stop			–	–	1	1
2	30676932-001	guide bushing			1	1	1	1
3	30679359-001	spring, scale latch			–	1	–	1
4	30676724-001	bracket			1	–	1	–
	30679357-001	bracket			–	1	–	1
5	30676707-001	bracket assembly with pulley			1	1	–	–
6	30367243-001	pulley, ball bearing			as req'd			
7	*	screw, 3-48 X 3/16			as req'd			
8	30682368-001	bracket assembly with pulley **			–	–	1	–
9	30682299-002	bracket assembly with pulley			–	–	–	1
10	30682268-002	bracket assembly with pulley			–	–	1	–
11	30676703-001	bracket assembly with pulley**			1	–	–	–
12	*	screw 6-32 phillips hd. 3/16			as req'd			
13	*	6-32, phillips hd. 5/16			1	1	2	2

* commercially available parts
** not part of 30676774-TAB assembly

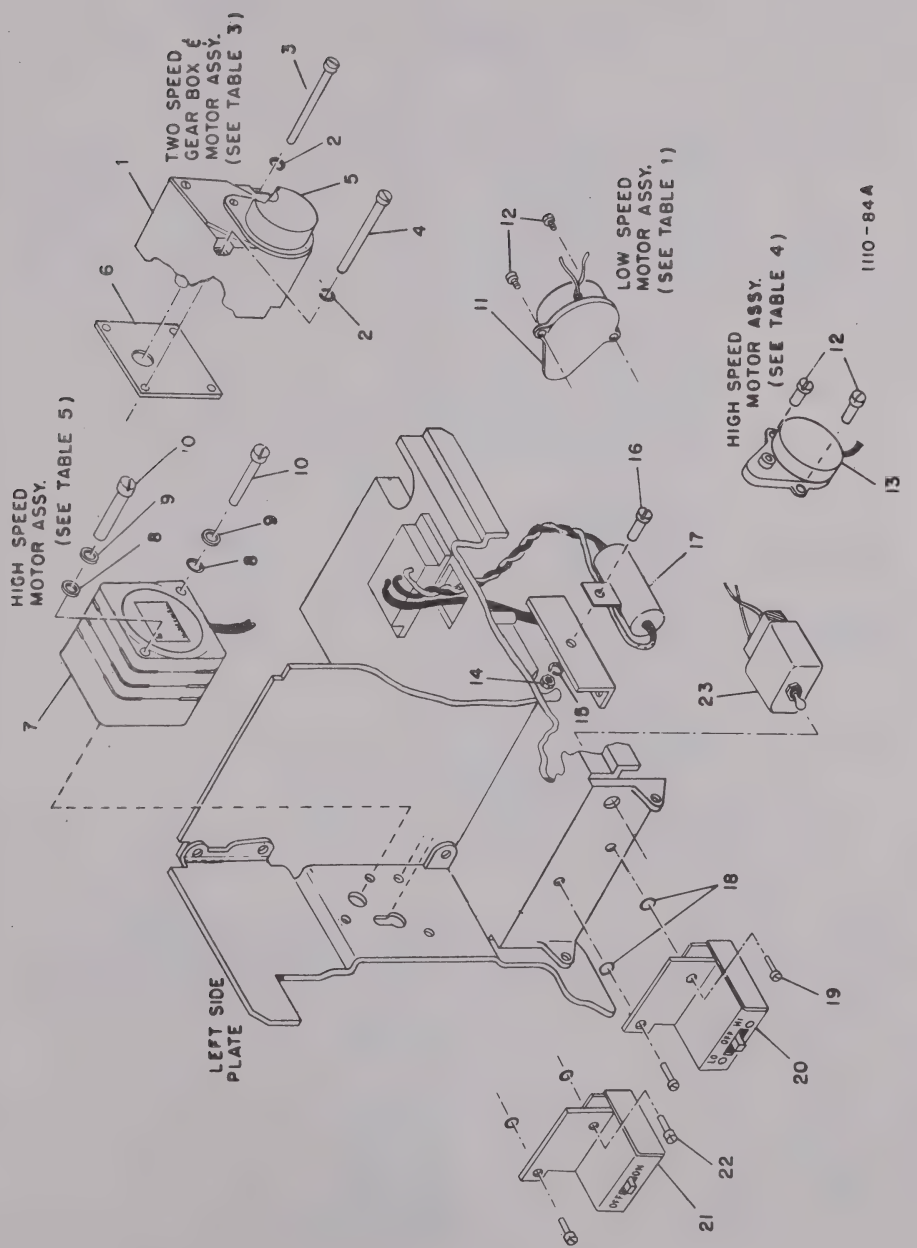
TWO SPEED GEAR BOX & MOTOR ASSY. (SEE TABLE 3)
LOW SPEED MOTOR ASSY. (SEE TABLE 1)
HIGH SPEED MOTOR ASSY. (SEE TABLE 4)
HIGH SPEED MOTOR ASSY. (SEE TABLE 5)
LEFT SIDE PLATE
1110-84A

Figure 4. Chart Drive Motors

7

ELECTRONIK 111 & 112
STRIP CHART SIDE PLATES & CHART
DRIVE ASSEMBLY
PARTS LIST

Figure and Key No.	Part No.	Description	Recom'd Spare Parts Per 1	Recom'd Spare Parts Per 10	Quantity
1	30680265-TAB	gear head & gear motor assy. (see Table 3)			1
2	*	lockwasher #6			2
3	*	bolt 10-32 fil. hd. 1 3/4			1
4	*	bolt 10-32 fil. hd. 1 3/8			1
5	30680268-TAB	gear motor assembly (see Table 3)	1	2	1
6	30723606-003	spacer plate			1
7	30676740-TAB	motor assy. (hi speed, see Table 5)	1	2	1
8	*	washer .203 ID X .312 OD X .064 THK			2
9	*	lockwasher #10			2
10	*	screw 10-32 rd.hd. 2 3/8			2
11	30370498-TAB	motor assy. (low speed, see Table 1)	1	2	1
12	*	screw 6-32 bdg. hd 3/16			2
13	30677496-TAB	motor assy. (hi speed see Table 4)	1	2	1
14	*	nut, hex 4-40			1
15	*	lockwasher #4			1
16	*	screw 4-40 bdg. hd 1/4			1
17	30677498-TAB	capacitor assy. (see Table 4 & 5)			1
18	30362173-000	spacer			2
19	*	screw 8-32 bdg. hd. 7/16			2
20	30680263-002	switch assy., two speed chart drive			1
21	30682332-001	switch, chart drive 112, single speed (option on one & two pen, standard on multipoint)			1
22	*	screw 8-32 bdg. hd. 5/16			2
23	30676832-002	switch, chart drive 111, single speed, (Option on one & two pen, standard on multipoint)			1

* commercially available parts

TABLE 1

CHART DRIVE MOTOR 120V 50/60 Hz		
Part No.	Chart Speed	RPM
30370498-013	1"/hr	1/40
30370498-014	2"/hr	1/20
30370498-015	6"/hr	3/20
30370498-016	10"/hr	1/4
30370498-017	12"/hr	3/10
30370498-018	20"/hr	1/2
30370498-019	30"/hr	3/4
30370498-020	60"/hr	1 1/2

TABLE 2

CHART SPEED CHANGE GEARS 120 VOLTS				
Use	Gear No.	Teeth	Ratio	Hertz
2	30676716-002	60T	1:1	60
1	30676716-003	80T	2:1 or	60
1	30676716-001	40T	1:2	60
1	30676716-004	45T	1:2	50
1	30676716-005	75T		50
1	30676716-007	84T	2:1	50
1	30676716-006	35T		50
1	30676716-009	66T	1:1	50
1	30676716-008	55T		50

TABLE 3

2 SPEED GEAR BOX & MOTOR ASSEMBLY (120V / 50 or 60 Hz.) (See Section 758-) for detail pars of gear box only)						
Assembly No.	Basic Chart Speed	Jump Speed	Ratio	Gear Box Only	Motor Only	RPM
30680265-009	10"/hr.	1"/hr.	10:1	30680266-002	30680268-005	2.5
30680265-008	20"/hr.	2"/hr.	10:1	30680266-002	30680268-004	5
30680265-007	60"/hr.	6"/hr.	10:1	30680266-002	30680268-002	15
30680265-005	120"/hr.	12"/hr.	10:1	30680266-002	30680268-001	30
30680265-012	30"/hr.	0.5"/hr.	60:1	30680266-001	30680268-003	7.5
30680265-011	60"/hr.	1"/hr.	60:1	30680266-001	30680268-002	15
30680265-010	120"/hr.	2"/hr.	60:1	30680266-001	30680268-001	30

TABLE 4

CHART DRIVE MOTOR 120V 50/60 Hz			
Part No.	Chart Speed	RPM	Capacitor Assembly
30677496-002	2"/min.	3	30677498-001
30677496-003	4"/min.	6	30677498-001
30677496-004	6"/min.	9	30677498-001
30677496-005	10"/min.	15	30677498-001
30677496-006	12"/min.	18	30677498-001

TABLE 5

CHART DRIVE MOTOR (STACK TYPE) (See Section 759- for detail parts of motor)					
Part No.	Chart Speed	Ratio	RPM	HZ	Capacitor Assembly
30676740-007	20"/min.	60:1	30	60	30677498-002
30676740-005	30"/min.	40:1	45	60	30677498-002
30676740-007	20"/min.	60:1	30	50	30677498-003
30676740-005	30"/min.	40:1	45	50	30677498-003

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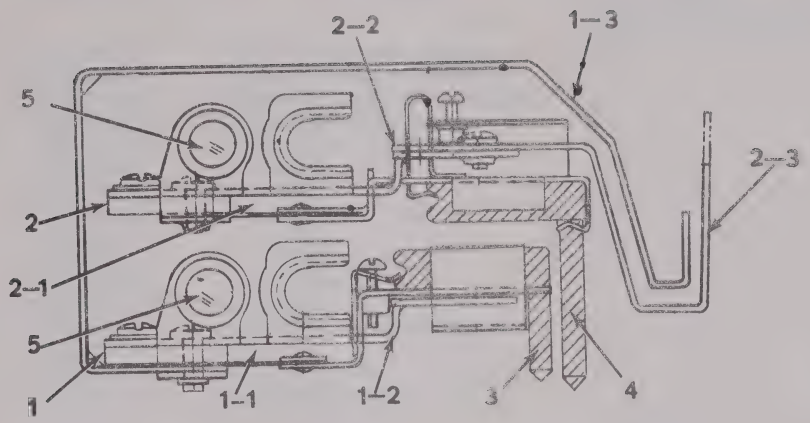


Figure 1. - Cross Section-fibre tip ink cartridge carriage assemblies

Figure and Key No.	Part No.	Description	Recomm'd Spare Parts Per 1	Recomm'd Spare Parts Per 10	Quantity
1					
1	30733244-001	# 1 pen carriage assembly			1
1-1	30679376-001	pen carriage			1
1-2	30733205-001	pen carrier # 1 pen			1
1-3	30676695-001	pointer # 1 pen			1
2	30733246-001	# 2 pen carriage assembly			1
	30733246-002	motor driven set point pen carriage assembly			1
2-1	30679376-001	pen carriage			1
2-2	30733206-001	carrier # 2 pen			1
2-3	30676683-001	pointer # 2 pen			1
	30733243-001	pointer-motor driven set point			1
3	30733204-001	# 1 pen cartridge - red			2
	30733241-001	# 1 pen cartridge - red (pkg of 4)	2*	—	1
	30733241-003	# 1 pen cartridge - red (pkg of 12)	—	4*	1
4	30733204-002	# 2 pen cartridge - purple	—	—	2
	30733241-002	# 2 pen cartridge - purple (pkg of 4)	2*	—	1
	30733241-004	# 2 pen cartridge - purple (pkg of 12)	—	4*	1
5	30679378-001	guide rod class 111			1
	30682271-001	guide rod class 112			1

* - Red and Purple required for two-pen instrument.
Red only for one-pen or motor driven set point instrument.

Figure and Key No.	Part Number	Description	Quantity 677431-				
			001	002	003	004	005
	30677431-001	Accessory Kit, one servo strip chart	1				
	30677431-002	Accessory Kit, one servo circular chart		1			
	30677431-003	Accessory Kit, circular scale or multipoint			1		
	30677431-004	Accessory Kit, two servo strip chart				1	
	30677431-005	Accessory Kit, two servo circular chart					1
1	30079329-000	bottle, oil	1	1	1	1	1
2	30733204-001	pen cartridge (red)	2	0	0	2	0
3	30015234-000	bottle, general purpose red ink	0	2	0	0	2
4	30013931-001	pen cleaners	0	1	0	0	1
5	30040947-003	wrench for # 5 screw	1	1	1	1	1
6	30368803-003	wrench for # 2 screw	1	1	1	1	1
7	30682609-001	cable assembly	1	1	1	1	1
8	30360711-000	wrench for # 4 set screw # 0 cap screw	1	1	1	1	1
9	30676915-001	lockpin	1	1	1	1	1
10	30733204-002	pen cartridge (purple)	0	0	0	2	0
11	30074637-001	bottle, general purpose purple ink	0	0	0	0	2
12	30040949-000	wrench for # 8 set screw	1	0	1	1	0

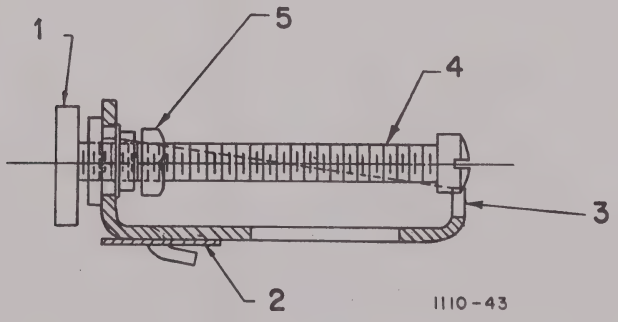
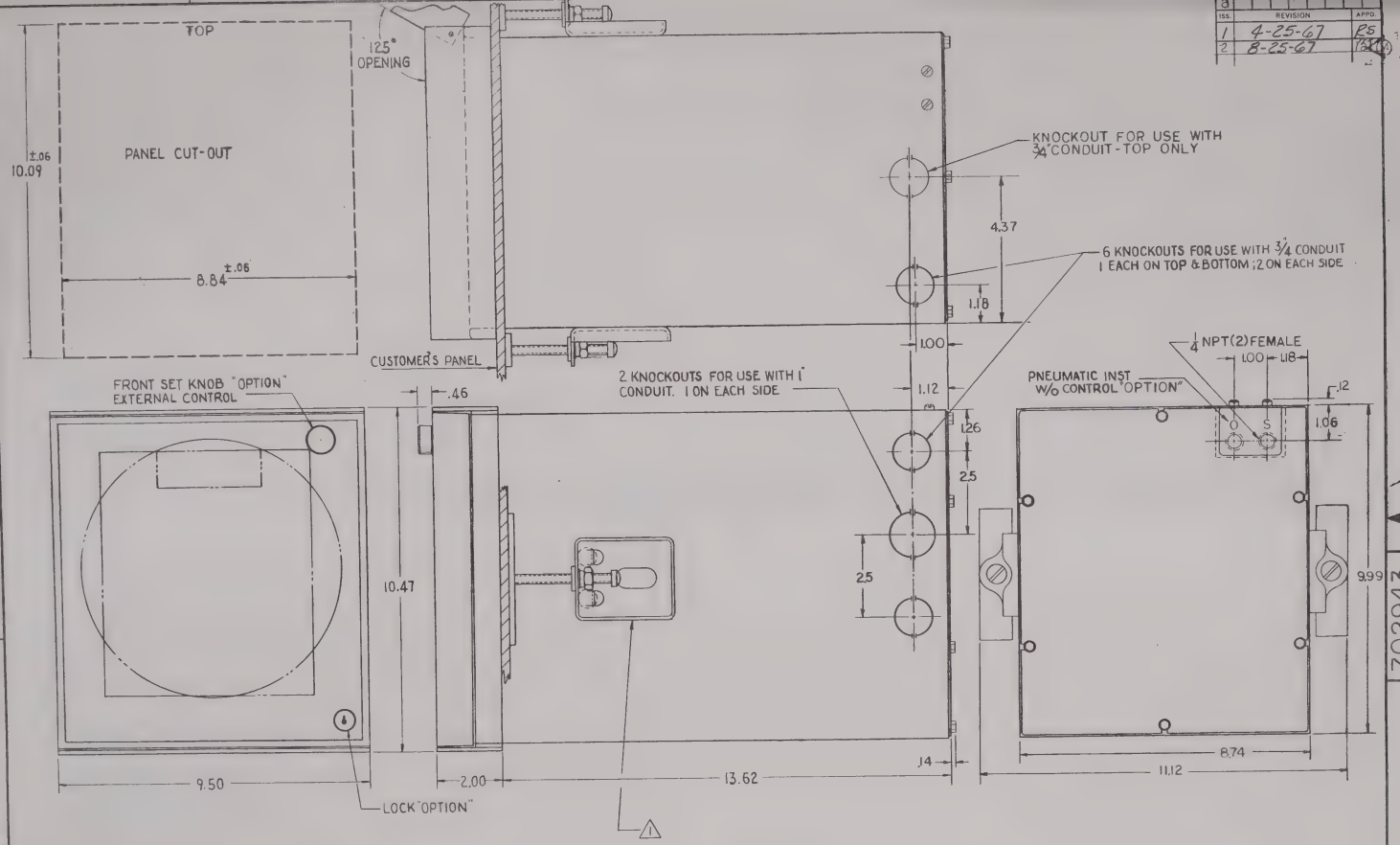


Figure 1. Flush Mounting Accessories

Figure and Key No.	Part Number	Description	Quantity		
			000	002	003
	30359383-000	Flush Mounting Accessories	1		
	30359383-002	Flush Mounting Accessories		1	
	30359383-003	Flush Mounting Accessories			1
1	30078234-000	plate	2	2	0
	30680406-000	plate	0	0	2
2	30352699-000	cushion pad	2	2	2
3	30076714-000	mounting bracket and hub assembly	2	2	2
4	30076713-001	screw, 5/16-18 fillister head, steel	2	2	2
5	30041273-000	nut, 5/16-18 nut	2	2	2

All the reference wiring diagrams, connection drawings and dimension drawings are located beyond this page. Because they are selected specific to the instrument model number which appears on the cover, the drawings, can only be indexed through the sectionalized table of contents pages.



ISS.	REVISION	APPD.
1	4-25-67	RS
2	8-25-67	

3 - MIN. RECOM. DISTANCE BETWEEN WALLS AND SIDES OF INST. - 6 IN.
2 - MIN. RECOMMENDED CENTERLINE DISTANCE BETWEEN TWO INSTRUMENTS MOUNTED SIDE BY SIDE - 11.3 IN.
⚠1 FOR PANEL MTG USE KIT 359383-000
NOTE:

REPRO. LOC.	
CANADA	✓
SCOTLAND	
GERMANY	
JAPAN	
FRANCE	
AUSTRALIA	
BRAZIL	
FIRST USED ON	
REF.	
MATERIAL	
FINISH	
DR.	3-66
CHK.	3-66
ENGR.	4-26-67
MFG.	4-26-67

HONEYWELL INC.
PHILADELPHIA DIVISION

MOUNTING DIMENSIONS
PANEL MOUNTED SMALL CASE CLASS III INST

DESIGN. SUPVR. APPL.
SIZE C
DRAWING NO. 702943
SCALE 1/2 - SIZE SHEET

7766-HM-290

F-3203 (8/64)

TBI CUSTOMER TERMINAL PANEL

TERM	INTERNAL FUNCTION	REF DIAGRAM
1 2 3 4	PV ABOVE SP; 10 20 30 40 ERROR GENERATOR	730331
B	REMOTE CHART SWITCH FOR SINGLE SPEED CHART DRIVE	703114
A A	EVENT PEN	730330
5 C 9 NC 13 NO	FRONT SET SWITCH #3 OR BACK SET SWITCH #6	730326
6 C 7 NC 8 NO	FRONT SET SWITCH #4 OR BACK SET SWITCH #5	730326
10 L 11 NC 12 NO	FRONT SET SWITCH #2 OR BACK SET SWITCH #7	730326
14 C 15 NC 16 NO	FRONT SET SWITCH #1 OR BACK SET SWITCH #8	730326
D	#1 TRANSMITTING SLIDEWIRE WITHOUT TRIMPOTS; E C D	730332
E	#1 TRANSMITTING SLIDEWIRE WITH TRIMPOTS; T/P #2 S/W T/P #1; CW CW; E F C H D	730332
K	TRANSMITTING SLIDEWIRE; J	730332

SERVO PLATE

SERVO SHAFT

TRANSMITTING SLIDEWIRES 1 2

BACK SET SWITCHES 5 6 7 8

DIFFERENTIAL GEAR SHAFT

1 3

FRONT SET SWITCHES 2 4

CONTROL SWITCH LEGEND

INPUT SIGNAL TYPE VARIATIONS

THERM. T/C: SHIELD, TC, JUMPER

TACHOMETER OR DC VOLTS OR DC CURRENT: SHIELD, V1, V2, V3, V4, JUMPER

RESISTANCE THERMOMETER: V1, V2, V3, V4, RX, JUMPER

GROUND DIRECTLY AND SEPARATELY TO A SUITABLE EARTH GROUND

GRD, FUSE, HOT, HOT SW

A. C. LINE

GROUND SIDE OF LINE

FUSED LINE SWITCH

3 NUMBER SHOWN ABOVE TERMINAL ON TBI MAYBE COVERED BY TAB WITH LETTER, SEE TABLE.

4 TERMINALS NOT SHOWN DUE TO VARYING LOCATION

1 120 VAC POWER, MAX OF 25 WATTS, FUSED AND CONTROLLED BY INSTRUMENT POWER SWITCH AVAILABLE AT "HOT SW" TERMINAL FOR CUSTOMER USE

5 IF TABLE VII OPTION 152, REMOTE CHART SWITCH SINGLE SPEED IS SPECIFIED SEE OPTION TABLE BELOW

5 - OPTIONS USING SAME TERMINALS NOT AVAILABLE TOGETHER

4 - OPERATION OF FRONT AND/OR BACK SET SWITCHES

CIRCUIT CONN BETWEEN TERM	CIRCUIT ENERGIZED WHEN PV IS
C AND NO	BELOW SWITCH SETTING
C AND NC	ABOVE SWITCH SETTING

C - SWITCH COMMON
NC - SWITCH NORMALLY CLOSED CONTACT
NO - SWITCH NORMALLY OPEN CONTACT

3 - BEFORE MAKING CONNECTIONS CHECK NAMEPLATE VOLTAGE RATINGS

2 - REFERENCE DIAGRAMS IN TABLE ARE FOR INTERNAL WIRING ONLY

1 - REFERENCE JUNCTION COMPENSATOR INSTALLED ON INSTRUMENTS WITH THERMOCOUPLE PRIMARY ELEMENTS ONLY

NOTES -

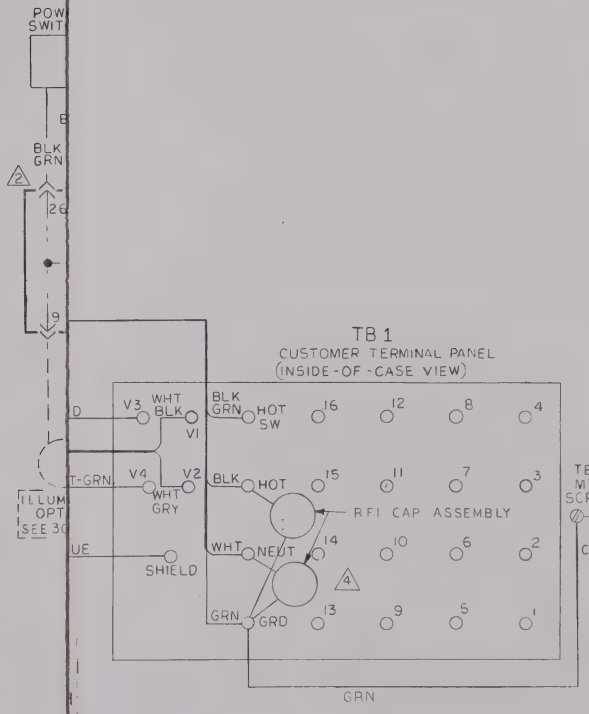
OPTIONS

EVENT PEN: 4, M, C, B; IF TABLE VIII OPTION 300 120V 50-60HZ OR 24 VDC IF TABLE VII OPTION 301

REMOTE CHART SW: 5, 120V 60HZ (FROM "HOT SW" OR "HOT" TERMINAL), B

REV	DATE	BY
1	2-24-67	25
	3-21-68	RK
	10-7-68	RK
	11-14-68	RK
	3-10-69	RK
	7-28-69	RK
	1-24-69	RK
	1-24-69	RK
	1-24

ISS	REVISION	APPD.
1	4-28-67	RS
2	REVISED 5-3-68	R.F.
3	REVISED 5-13-69	R.F.
4	REVISED 6-14-69	EW
5	REVD 10-6-70	RS
6	REVISED 1-7-71	RS
7	REVISION 3-1-71	RS
8	REVISED 4-14-76	SC
9	REVISED 11-19-76	BK



4 ADD 2 RFI CAP ASSEMBLY 30683461-001 TO INSIDE OF CUSTOMER T/B WHEN THE 1 MV/1 SEC AMPL 30679256-001 IS USED.

3 THESE COLOR COMBINATIONS & CONNECTIONS ARE USED ONLY WHEN INST. SPAN IS LESS THAN FIVE MILLIVOLTS OR BALANCE SPEED IS TWO SECONDS OR FASTER.

2 WHEN INSTRUMENT IS SUPPLIED WITHOUT POWER SW(TABLE VI, OPTION 150) A JUMPER IS PLACED ACROSS J2 TERMINALS 26 & 8.

1 AS SHOWN SERVO MOTOR WILL CUT OFF WITH POWER SWITCH. TO HAVE MOTOR CUT OFF WITH EITHER POWER SWITCH OR CHART SWITCH MOVE WHITE LEAD TO PIN 10.

NOTES

HONEYWELL INC
PHILADELPHIA DIVISION

ONE SERVO INSTRUMENT
WIRING DIAGRAM
CLASS III & 112

D 30730322

30730322

SC
BR
BH
FW

PLATE

7766-HM-292

ISS	REVISION	APPD
1	4-25-67	RS
2	REVISED 5-15-68	R.F.
3	REVISED 5-13-69	R.F.
4	REVISED 8-15-69	R.F.
5	REVISED 10-6-70	RS
6	" " 1-7-71	RS
7	REVISION, 3-2-71	RS
8	REVISED 4-19-72	RS
9	REVISED 11-19-76	BK

TABLE VII-151
OPTIONAL SWITCH
SINGLE SPEED
CHART MOTOR

POWER SWITCH

ORN CAP BLK GRN

BLK

BLK GRN

JUMPER

ILLUMINATION OPTIONAL SEE 30703065

SERVO MOTOR

CONNECTIONS FOR BASIC CHART SPEEDS THRU 60 IN./HR. SHOWN. FOR CHART SPEEDS FASTER THAN 60 IN./HR. SEE 30730328

CHASSIS GROUND

J4

J2 CONNECTOR BOARD
MOUNTED ON CHASSIS
SCHEMATIC OF PRINTED CIRCUIT SHOWN USING DOTTED LINE

SEE BELOW

J1 DRAWBRIDGE CONNECTOR

LOWER CASE LETTER

1 AMP FUSE

TB 1
CUSTOMER TERMINAL PANEL
(INSIDE-OF-CASE VIEW)

RF CAP ASSEMBLY

CASE

SHIELD

GRN

MCU

SERVO AMPLIFIER

C V U

T1

SERVO UNIT

REBALANCING SLIDEWIRE

CONNECTIONS BETWEEN J1 & J2 FOR RADIAMATIC WITH CAL. RHEOSTAT ONLY

5K RHEOSTAT

416Ω

TIE POINT

1 ADD 2 R F I CAP ASSEMBLY 30683461-001 TO INSIDE OF CUSTOMER T/B WHEN THE 1 MV/1 SEC AMPL 30679256-001 IS USED.

3 THESE COLOR COMBINATIONS & CONNECTIONS ARE USED ONLY WHEN INST. SPAN IS LESS THAN FIVE MILLIVOLTS OR BALANCE SPEED IS TWO SECONDS OR FASTER.

2 WHEN INSTRUMENT IS SUPPLIED WITHOUT POWER SW (TABLE VI, OPTION 150) A JUMPER IS PLACED ACROSS J2 TERMINALS 2 & 8.

1 AS SHOWN SERVO MOTOR WILL CUT OFF WITH POWER SWITCH. TO HAVE MOTOR CUT OFF WITH EITHER POWER SWITCH OR CHART SWITCH MOVE WHITE LEAD TO PIN 10.

NOTES

HONEYWELL INC.
PHILADELPHIA DIVISION

ONE SERVO INSTRUMENT
WIRING DIAGRAM
CLASS III $ 112

DRAWING NO. D 30730322

30730322

PLATE

7766-HM-292

1204 18/64

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Honeywell

Honeywell Charts

Honeywell charts are specially designed and made exclusively for use with the Honeywell recorder and are calibrated and tested to insure the very best of records. As the owner of Honeywell recorders, you will naturally want to help maintain its high accuracy and sensitivity by using Honeywell charts.

There are two types of charts, circular and strip, and each type and size is available with a wide variety of ranges and calibrations to suit your every need.

Here are the features that make Honeywell charts the highest quality charts available. Along every step of the production line—from the blending of wood pulps to the packaging and shipping of your charts—strict requirements and controls are enforced to guarantee the quality and precision workmanship so necessary to best serve your needs.

Features

COMPOSITION
All Honeywell charts are made from 100% bleached chemical wood pulp, free from groundwood, de-inked stock, or low-grade pulps. This guarantees uniformity throughout.

STRENGTH
Special treatments of all chart papers give the best writing surface; charts are treated for wet strength so that an oscillating pen will not feather or break through.

DIMENSIONAL STABILITY
The expansion or contraction of chart papers will not exceed an average of 1% from 10 to 85% relative humidity change. And we're continually working to reduce this low figure.

CALIBRATION
An electronic computer which calculates the number of graduations, the degrees of thickness of each line marking, and the exact distances between lines, provides the most accurate, uniform charts available.

HUMIDITY COMPENSATION
Standard strip charts have elongated holes on one side. This permits any fractional expansion or contraction of chart, due to changes in humidity, to take place in least-used portion of chart.

SMOOTHNESS
The high-quality pulp, uniform thickness, and expertly controlled calendering of Honeywell chart paper insure a smooth surface that will offer a negligible amount of resistance to the recording pen.

BRIGHTNESS
All Honeywell charts are easy to read because they have a brightness rating of 77 to 87 as measured on a G.E. brightness meter. Your operators can easily see chart graduations, time markings, recording marks, etc.

APPEARANCE
All Honeywell charts are clean, well-formed, and free of dirt particles, slime spots, holes, and similar defects.

SPECIAL PAPER
Charts can be made to order in special colors and special papers (such as Vellum for excellent reproducibility).

PACKAGING
All strip charts are rolled on a cardboard spool that easily fits into position in the recorder. Strip Charts are packaged individually; circular charts 100 to a box. All boxes have adequate space to record dates, etc., and serve as convenient, space saving containers for storing charts after use.

Specifications

STRIP CHARTS

Honeywell Recorder	*VumatiK* and *VutroniK*	*ElectroniK 1113*	*ElectroniK*		*ElectroniK 153 and 1123*
			195	*196*	
Chart Roll Size	4.328"	6.5"	6.5"	11.3"	12"
Calibrated Width	4"	6"	6"	10.433"	11"
Length	53 ft.	122 ft.	122 ft.		122 ft.
Line Color	Beige	Gray	Green		Blue
Number Color	Black	Black	Green		Black
Std. Time Markings	3/4", 1", 1 1/2"	1/2", 1", 2", 4"	10 lines/"		1/2", 1", 2", 4"
Packaged Unit/box	1 roll	1 roll	1 roll		1 roll

CIRCULAR CHARTS

Honeywell Recorder	*ElectroniK 1112*	RH and Temperature Class 612	Class 60, 70	Class 152, 22, 45, 47, 60 & 70
Chart Diameter	6.5"	8"	10"	12"
Calibrated Width	3"	3.268"	4.75"	4.75"
Line Color	Beige	Blue	Blue	Blue
Number Color	Beige	Blue	Blue	Blue
Packaged Unit/Box	100	100	100	100

USE HONEYWELL CHARTS AND INK

Remember . . . . . the quality of the record is only as good as the chart paper and ink that is used. Your new Honeywell recorder includes Honeywell chart and ink and we urge you to continue to use only these same products when replacement is necessary.

None better . . . . . there is no better quality available anywhere than we furnish in Honeywell charts and you can continue to obtain this high quality recording performance by specifying the number that appears on the chart and ordering it from your local Honeywell sales office.

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